

AD-A135 604 AUSTRALIAN TRI-SERVICE ANTHROPOMETRIC SURVEY 1977 PART 1/1
2 SURVEY RESULTS: (U) AERONAUTICAL RESEARCH LABS
MELBOURNE (AUSTRALIA) K C HENDY JUL 79 ARL/SYS-15-PT-2
UNCLASSIFIED

AUSTRALIAN TRI-SERVICE ANTHROPOMETRIC SURVEY 1977 PART
2 SURVEY RESULTS: (U) AERONAUTICAL RESEARCH LABS
MELBOURNE (AUSTRALIA) K C HENDY JUL 79 ARL/SYS-15-PT-2

11

UNCLASSIFIED

F/G 6/14

NL

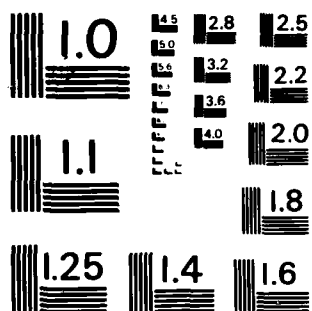
[illegible]

END

DATE

Index

1-8



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A



AD-A135 604

DEPARTMENT OF DEFENCE
DEFENCE SCIENCE AND TECHNOLOGY ORGANISATION
AERONAUTICAL RESEARCH LABORATORIES
MELBOURNE, VICTORIA

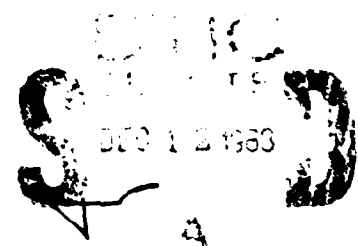
SYSTEMS REPORT 15

AUSTRALIAN
TRI-SERVICE ANTHROPOMETRIC SURVEY, 1977:
PART 2. Survey results: Combined Services AIRCREW
group

by

K. C. HENDY

Approved for Public Release



DMC FILE COPY

© COMMONWEALTH OF AUSTRALIA 1979

COPY No

JULY, 1979

83 12 09 061

DEPARTMENT OF DEFENCE
DEFENCE SCIENCE AND TECHNOLOGY ORGANISATION
AERONAUTICAL RESEARCH LABORATORIES

SYSTEMS REPORT 15

**AUSTRALIAN
TRI-SERVICE ANTHROPOMETRIC SURVEY, 1977:
PART 2. Survey results: Combined Services AIRCREW
group**

by

K. C. HENDY

SUMMARY

An anthropometric survey of approximately 3000 male members of the three Australian military branches was conducted during 1977. Part 2 of this nine-part document contains the results of the analysis for the combined services AIRCREW group data. This group is an amalgamation of 456 aircrew from Air Force, Army and Navy branches.

POSTAL ADDRESS: Chief Superintendent, Aeronautical Research Laboratories,
Box 4331, P.O., Melbourne, Victoria, 3001, Australia.

DOCUMENT CONTROL DATA SHEET

Security classification of this page: Unclassified

1. Document Numbers

- (a) AR Number:
AR-001-754
- (b) Document Series and Number:
Systems Report 15
- (c) Report Number:
ARL-SYS-Report-15

2. Security Classification

- (a) Complete document:
Unclassified
- (b) Title in isolation:
Unclassified
- (c) Summary in isolation:
Unclassified

3. Title: AUSTRALIAN TRI-SERVICE ANTHROPOMETRIC SURVEY, 1977:
PART 2. Survey Results: Combined Services AIRCREW Group

4. Personal Author(s):
K. C. Hendy

5. Document Date:
July, 1979

6. Type of Report and Period Covered:

7. Corporate Author(s):
Aeronautical Research Laboratories

8. Reference Numbers
(a) Task: DEF 78/56
(b) Sponsoring Agency:
Defence

9. Cost Code: 734470

10. Imprint (Publishing establishment):
Aeronautical Research Laboratories,
Melbourne

11. Computer Program(s)
(Title(s) and language(s)):

12. Release Limitations (of the document): Approved for Public Release

12.0. Overseas:	N.O.		P.R.	1	A		B		C		D		E	
-----------------	------	--	------	---	---	--	---	--	---	--	---	--	---	--

13. Announcement Limitations (of the information on this page): No Limitation

14. Descriptors:
Anthropometry
Surveys
Biomedical data
Flight Crews
Australia

15. Cosati Codes:
0614
0505

16.

ABSTRACT

An anthropometric survey of approximately 3000 male members of the three Australian military branches was conducted during 1977. Part 2 of this nine-part document contains the results of the analysis for the combined services AIRCREW group data. This group is an amalgamation of 456 aircrew from Air Force, Army and Navy branches.

CONTENTS

	Page No.
1. INTRODUCTION	1
2. SITTING POSTURE	1
REFERENCES	
VISUAL INDEX	
TABLE 1: Age	
TABLE 2: Foot Length	
TABLE 3: Foot Breadth	
TABLE 4: Hand Length	
TABLE 5: Palm Length	
TABLE 6: Hand Breadth	
TABLE 7: Thumb Length	
TABLE 8: Inner Hand Grip Circumference	
TABLE 9: Head Circumference	
TABLE 10: Neck Circumference	
TABLE 11: Chest Circumference	
TABLE 12: Waist Circumference	
TABLE 13: Buttock Circumference	
TABLE 14: Vertical Trunk Circumference	
TABLE 15: Buttock-Heel Length	
TABLE 16: Mass	
TABLE 17: Sitting Height	
TABLE 18: Eye Height—Sitting	
TABLE 19: Shoulder Height—Sitting	
TABLE 20: Acromial Height—Sitting	



Identification/	
Availability Code	
Avail. Symbol	
Dist	Special
A-1	

TABLE 21: Elbow Rest Height

TABLE 22: Popliteal Height

TABLE 23: Bideltoid Breadth

TABLE 24: Hip Breadth

TABLE 25: Functional Reach

TABLE 26: Buttock-Knee Length

TABLE 27: Thigh Clearance Height

TABLE 28: Stool Height

TABLE 29: Stature

TABLE 30: Crotch Height

TABLE 31: Chest Depth

TABLE 32: Head Breadth

TABLE 33: Inter-Elbow Breadth

DISTRIBUTION

1. INTRODUCTION

Part 2 of Systems Report 15 contains the results of an analysis performed on the combined services AIRCREW data group. This group is an amalgamation of three groups which were sampled independently in the original sample selection procedure. The sampling procedure and subsequent combination of these groups are described in Part 1 of Reference 1 which details the scientific conduct of the survey. Other groups subjected to separate analysis are reported in Parts 3 to 9 of Reference 1.

The composition of the combined AIRCREW group is as follows:

	Number
AIR	
Aircrew	190
ARMY	
Aviation	88
NAVY	
Fleet Air Arm	178
	<hr/>
Total:	456
	<hr/>

An analysis was performed on the AIRCREW data and summary statistics derived. The results of this analysis are presented in Tables 1 to 33. An index to the tabulated results appears in the contents listing of this document. For convenience in using the information, a Visual Index and alphabetical listing precedes Table 1. The photographs accompanying the Tables are to illustrate technique only.

2. SITTING POSTURE

For all sitting measurements the height of the hydraulic stool was adjusted so that with the subject sitting erect, back free of the wall, the line joining the femoral marks was horizontal and with his feet flat on the floor the line joining the upper and lower fibular marks was vertical.

Without changing the position of his legs after adjusting the stool the subject sat erect, back free of the wall with the trunk straight, upper arms vertical, elbows resting lightly against the sides and the forearms extended so that the hands rested on mid-thighs. The shoulders were equally relaxed.

Note: In Tables 1 to 33

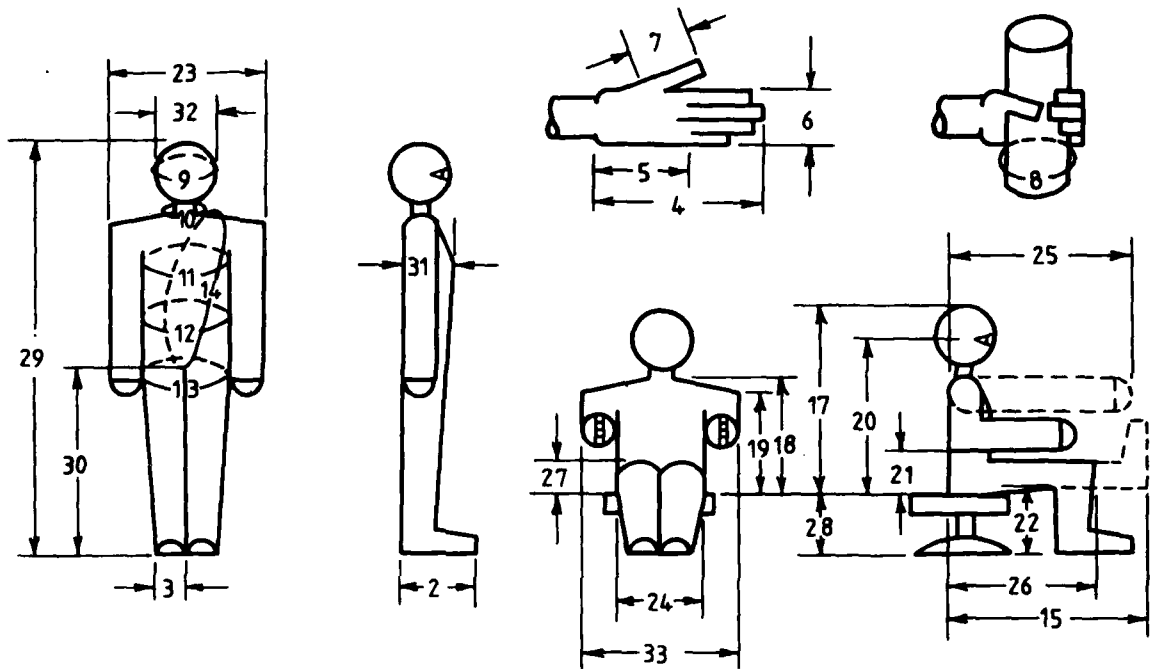
— unsmoothed data and 'Normal' fit
xxx 3rd order Gram Charlier fit

REFERENCES

1. Hendy, K. C.: *Australian Tri-service Anthropometric Survey, 1977:*
 - PART 1. Survey planning, conduct, data handling and methods of analysis.
 - PART 3. Survey results: Air Force TRANSPORT and CATERING group.
 - PART 4. Survey results: Air Force TECHNICAL and CLERICAL group.
 - PART 5. Survey results: Army CATERING group.
 - PART 6. Survey results: Army TECHNICAL group.
 - PART 7. Survey results: Army WEAPON USERS and OTHERS group.
 - PART 8. Survey results: Navy CLEARANCE DIVER group.
 - PART 9. Survey results: Navy CONSOLIDATION group.
- Aeronautical Research Laboratories, Systems Report 15. Fishermen's Bend, Melbourne, Australia, 1979.

THIS PAGE INTENTIONALLY LEFT BLANK

VISUAL INDEX



Measurement	Table	Measurement	Table
Acromial Height—Sitting	19	Head Circumference	9
Age	1	Hip Breadth	24
Bideltoid Breadth	23	Inner Hand Grip Circumference	8
Buttock Circumference	13	Inter-Elbow Breadth	33
Buttock-Heel Length	15	Mass	16
Buttock-Knee Length	26	Neck Circumference	10
Chest Circumference	11	Palm Length	5
Chest Depth	31	Popliteal Height	22
Crotch Height	30	Shoulder Height—Sitting	18
Elbow Rest Height	21	Sitting Height	17
Eye Height—Sitting	20	Stature	29
Foot Breadth	3	Stool Height	28
Foot Length	2	Thigh Clearance Height	27
Functional Reach	25	Thumb Length	7
Hand Breadth	6	Vertical Trunk Circumference	14
Hand Length	4	Waist Circumference	12
Head Breadth	32		

TABLE 1

Age (years)

Number of Subjects : 456

Mean : 31.1

Standard Deviation : 6.5

Coefficient of Skewness: 0.64

Coefficient of Kurtosis : 0.43

Range of Data : 19-57

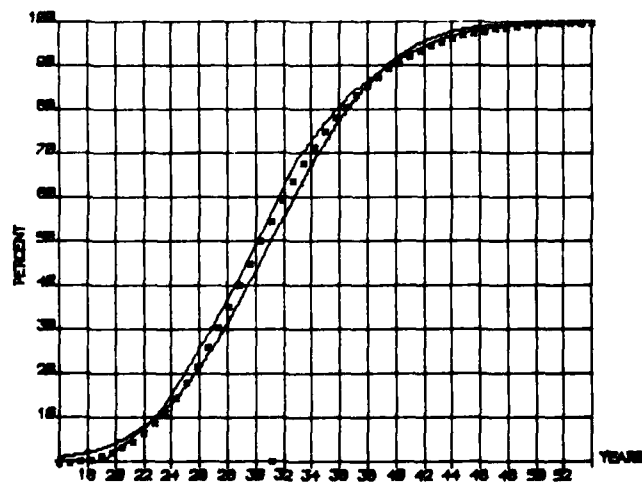
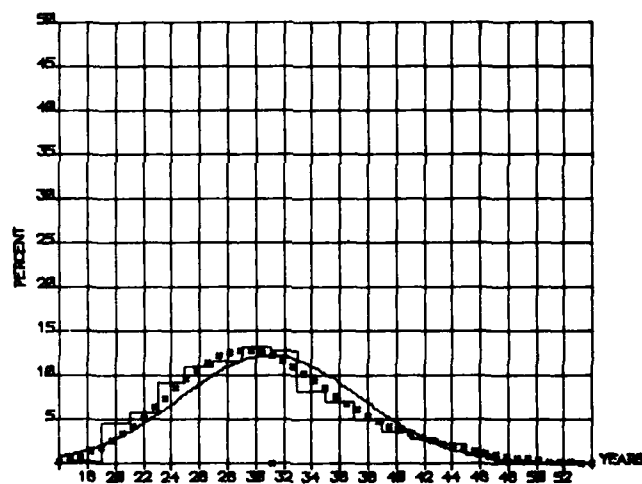


TABLE 2

Foot Length

Subject stands with his left foot in the foot-box, heel against the back wall and the medial side of the foot in contact with the side wall of the box. The datum edge is brought up to touch the most prominent toe. Record the distance of the datum edge from the back wall of the foot-box.

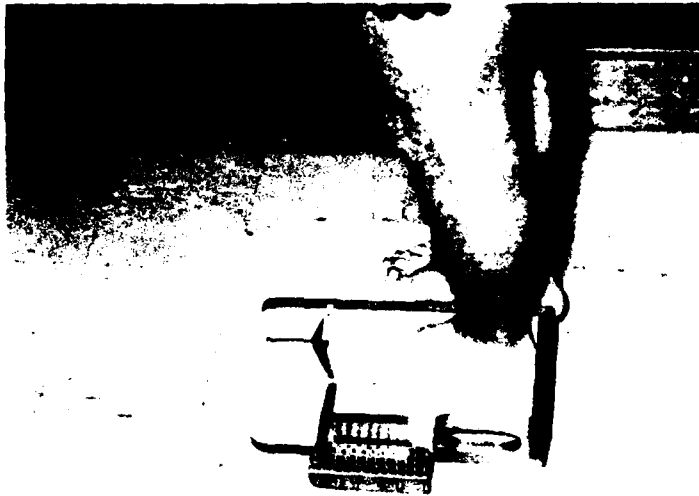
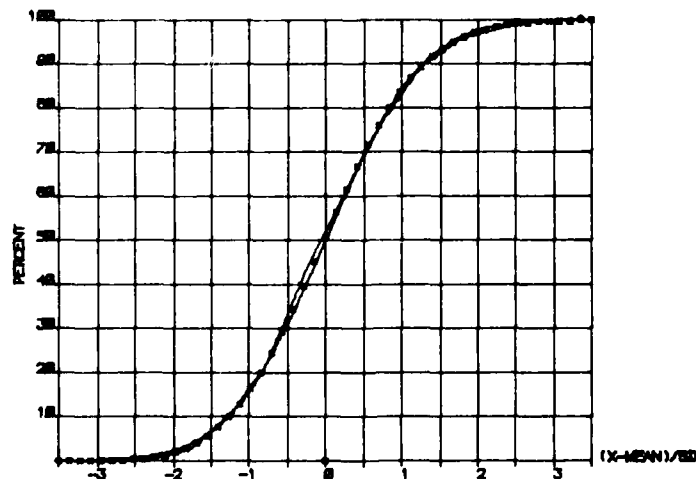
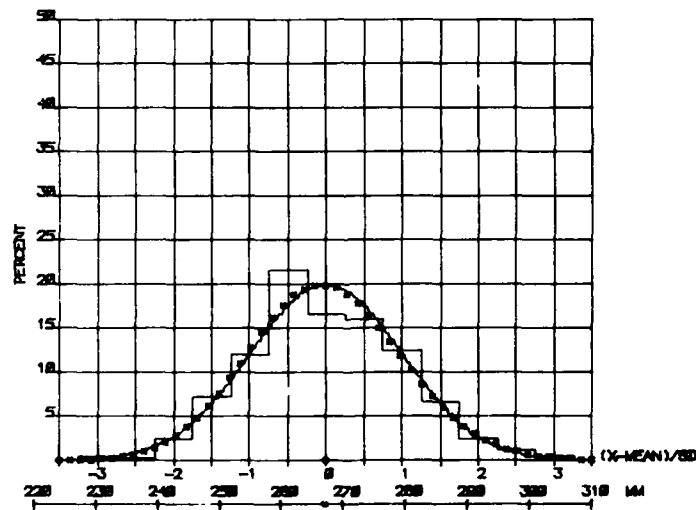


TABLE 2

Foot Length (mm)

Number of Subjects: : 456
 Mean: : 267.1
 Standard Deviation: : 12.3
 Coefficient of Skewness: 0.14
 Coefficient of Kurtosis : -0.12
 Range of Data : 231-304



1st percentile 240
 3rd percentile 245
 5th percentile 247
 10th percentile 252
 15th percentile 254
 20th percentile 257
 25th percentile 259
 30th percentile 260
 40th percentile 264
 50th percentile 267
 60th percentile 270
 70th percentile 273
 75th percentile 275
 80th percentile 277
 85th percentile 280
 90th percentile 283
 95th percentile 288
 97th percentile 291
 99th percentile 297

TABLE 3

Foot Breadth

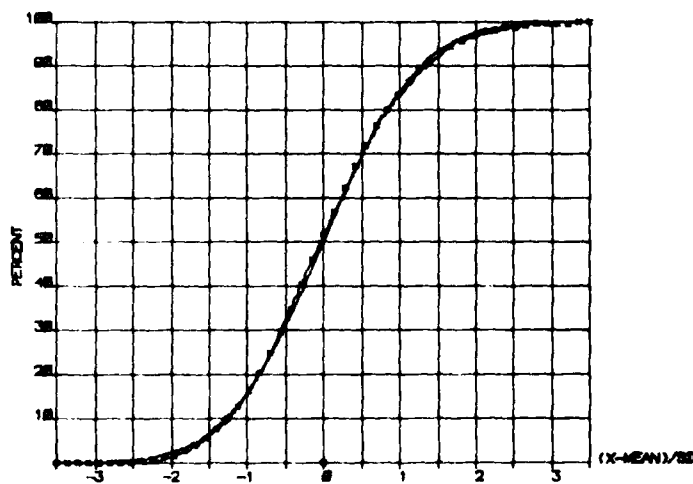
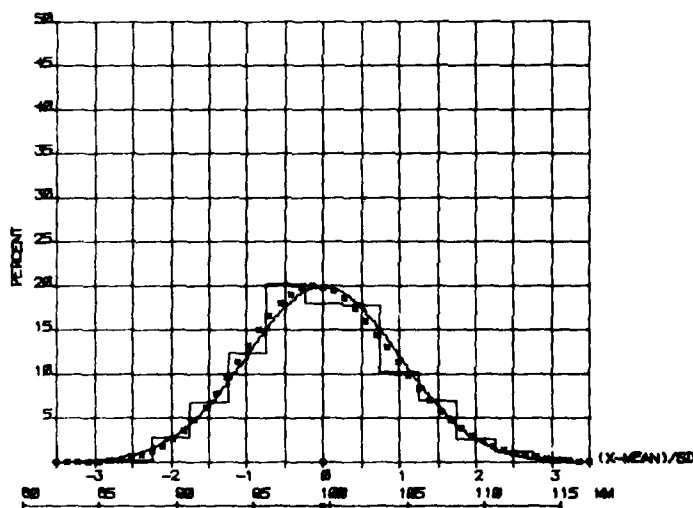
Subject stands with his left foot in the foot-box, heel against the back wall and the medial side of the foot in contact with the side wall of the box. The datum edge is brought into light contact with the widest aspect of the foot. Record the distance of the datum edge from the side wall of the foot-box.



TABLE 3

Foot Breadth (mm)

Number of Subjects : 456
 Mean : 99.5
 Standard Deviation : 4.9
 Coefficient of Skewness: 0.24
 Coefficient of Kurtosis : 0.14
 Range of Data : 87-114



1st percentile	89
3rd percentile	91
5th percentile	92
10th percentile	93
15th percentile	94
20th percentile	95
25th percentile	96
30th percentile	97
40th percentile	98
50th percentile	99
60th percentile	101
70th percentile	102
75th percentile	103
80th percentile	104
85th percentile	105
90th percentile	106
95th percentile	108
97th percentile	109
99th percentile	112

TABLE 4

Hand Length

Subject's left hand is fully extended and supinated in the axis of the forearm, fingers together. With the bar of the sliding calipers parallel to the longitudinal axis of the hand, measure the distance from the tip of the third digit to the wrist mark at the first major skin crease proximal to the base of the hypothenar eminence.

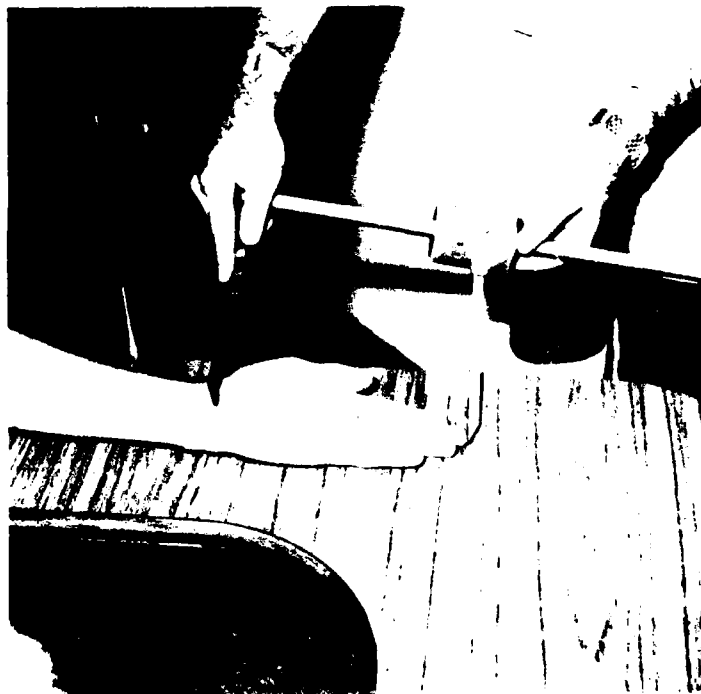
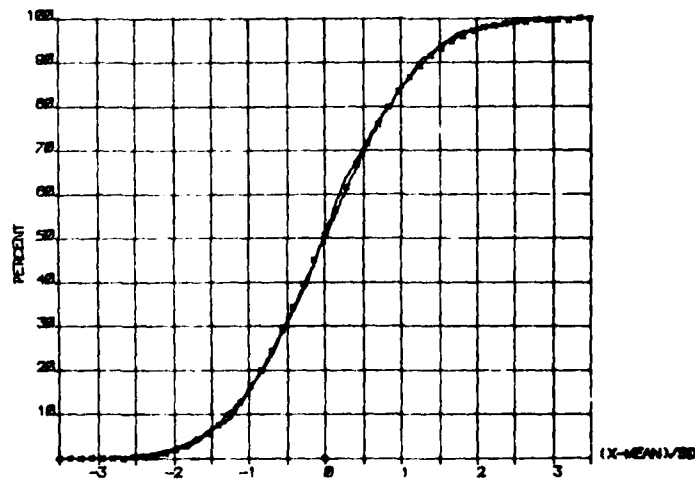
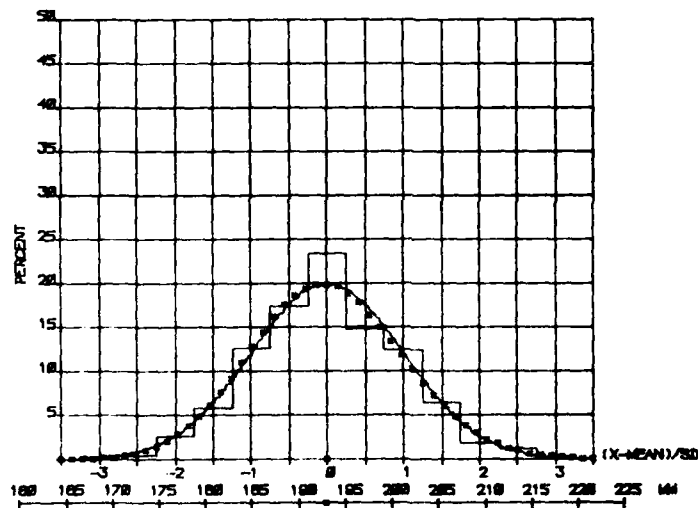


TABLE 4

Hand Length (mm)

Number of Subjects: : 456
 Mean : 193.0
 Standard Deviation : 8.2
 Coefficient of Skewness: 0.12
 Coefficient of Kurtosis : -0.23
 Range of Data : 170-217



1st percentile	175
3rd percentile	178
5th percentile	180
10th percentile	183
15th percentile	185
20th percentile	186
25th percentile	187
30th percentile	189
40th percentile	191
50th percentile	193
60th percentile	195
70th percentile	197
75th percentile	198
80th percentile	200
85th percentile	201
90th percentile	204
95th percentile	207
97th percentile	209
99th percentile	213

TABLE 5

Palm Length

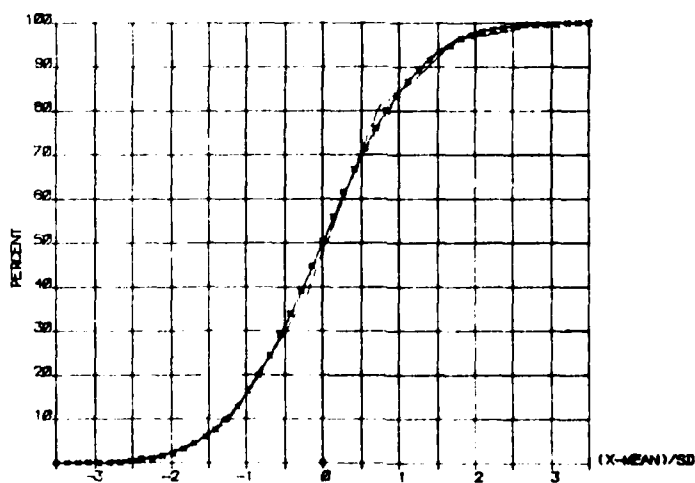
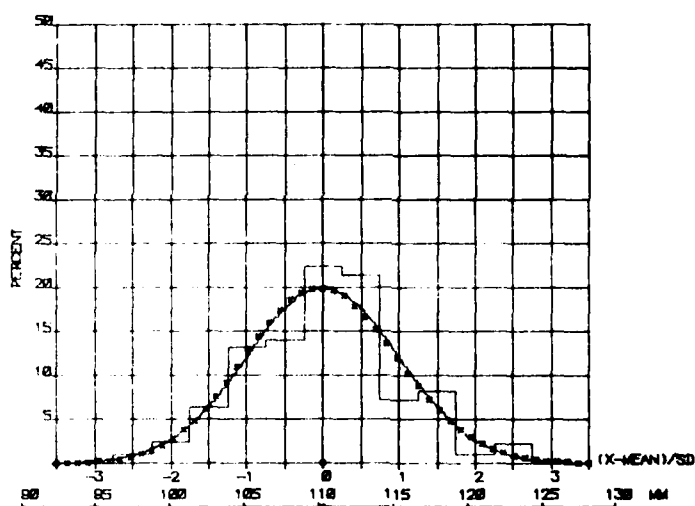
Subject's left hand is fully extended and supinated in the axis of the forearm, fingers together. With the bar of the sliding calipers parallel to the longitudinal axis of the hand, measure the distance from the skin fold at the junction of the third digit and the palm of the hand to the wrist mark at the first major skin crease proximal to the base of the hypothenar eminence.



TABLE 5

Palm Length (mm)

Number of Subjects : 456
 Mean : 110.3
 Standard Deviation : 5.1
 Coefficient of Skewness: 0.09
 Coefficient of Kurtosis : -0.12
 Range of Data : 97-125



1st percentile 99
 3rd percentile 101
 5th percentile 102
 10th percentile 104
 15th percentile 105
 20th percentile 106
 25th percentile 107
 30th percentile 108
 40th percentile 109
 50th percentile 110
 60th percentile 111
 70th percentile 113
 75th percentile 114
 80th percentile 115
 85th percentile 116
 90th percentile 117
 95th percentile 119
 97th percentile 120
 99th percentile 123

TABLE 6

Hand Breadth

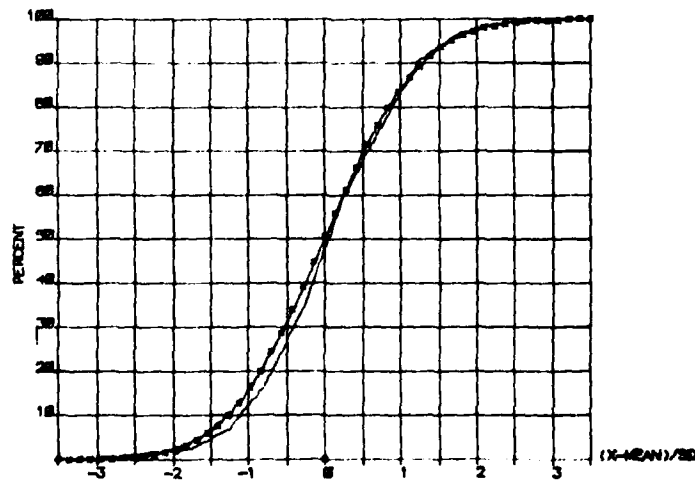
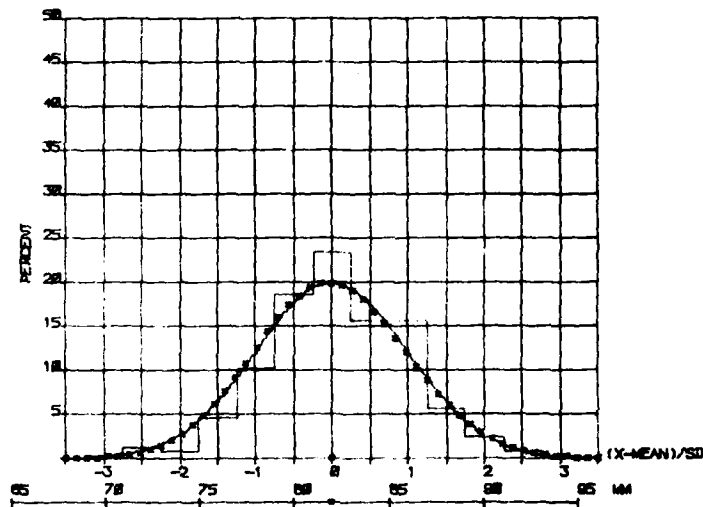
Subject's left hand is fully extended and supinated in the axis of the forearm, fingers together with the thumb held away from the hand. Using the sliding calipers measure the distance across the distal ends of the metacarpal bones.



TABLE 6

Hand Breadth (mm)

Number of Subjects : 456
 Mean : 82.0
 Standard Deviation : 4.0
 Coefficient of Skewness: 0.08
 Coefficient of Kurtosis : 0.46
 Range of Data : 68-95



1st percentile	73
3rd percentile	74
5th percentile	75
10th percentile	77
15th percentile	78
20th percentile	79
25th percentile	79
30th percentile	80
40th percentile	81
50th percentile	82
60th percentile	83
70th percentile	84
75th percentile	85
80th percentile	85
85th percentile	86
90th percentile	87
95th percentile	89
97th percentile	90
99th percentile	92

TABLE 7

Thumb Length

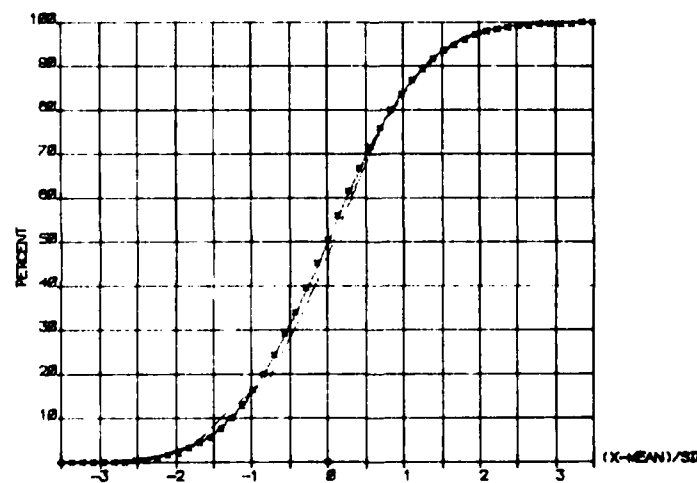
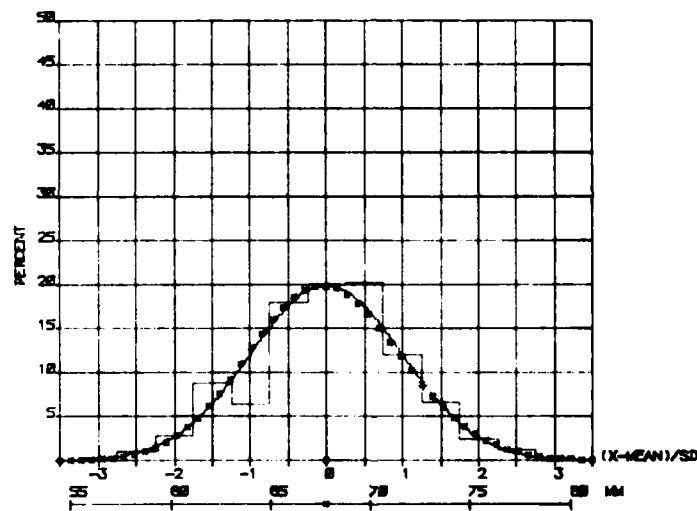
Subject's left hand is fully extended and pronated in the axis of the forearm, fingers together with the thumb held away from the hand. With the bar of the sliding calipers parallel to the longitudinal axis of the thumb, measure the distance from the tip of the thumb to the thumb mark at the first metacarpophalangeal joint.



TABLE 7

Thumb Length (mm)

Number of Subjects: : 456
 Mean : 67.8
 Standard Deviation : 3.8
 Coefficient of Skewness: 0.10
 Coefficient of Kurtosis : -0.04
 Range of Data : 57-79



1st percentile	59
3rd percentile	61
5th percentile	62
10th percentile	63
15th percentile	64
20th percentile	65
25th percentile	65
30th percentile	66
40th percentile	67
50th percentile	68
60th percentile	69
70th percentile	70
75th percentile	70
80th percentile	71
85th percentile	72
90th percentile	73
95th percentile	74
97th percentile	75
99th percentile	77

TABLE 8

Inner Hand Grip Circumference

The measuring device is a cone of linearly increasing diameter. The subject grips the cone firmly from behind with the left hand at the maximum diameter at which the thumb and third digit may be lightly opposed. The point of opposition lies over the line scribed on the front of the cone. The Inner Hand Grip Circumference is the circumference of the cone in a horizontal plane containing the point of opposition.

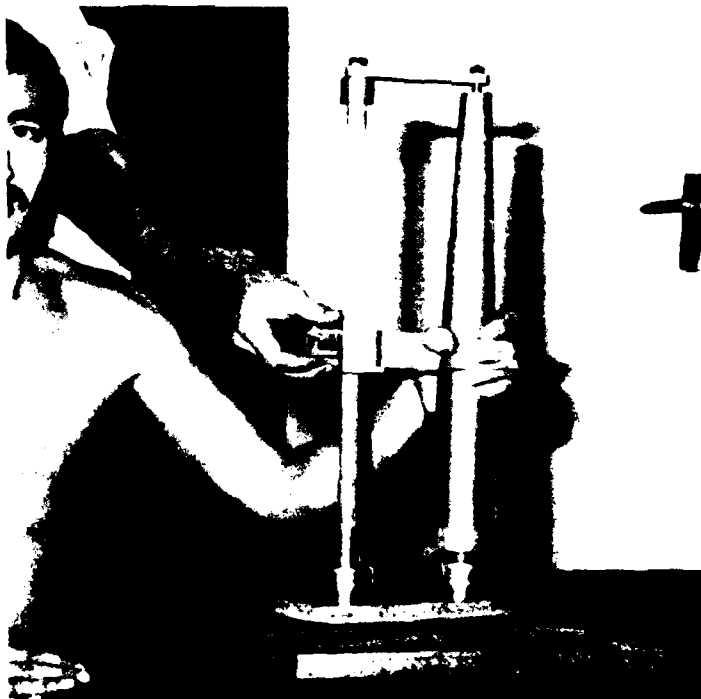


TABLE 8

Inner Hand Grip Circumference (mm)

Number of Subjects : 456

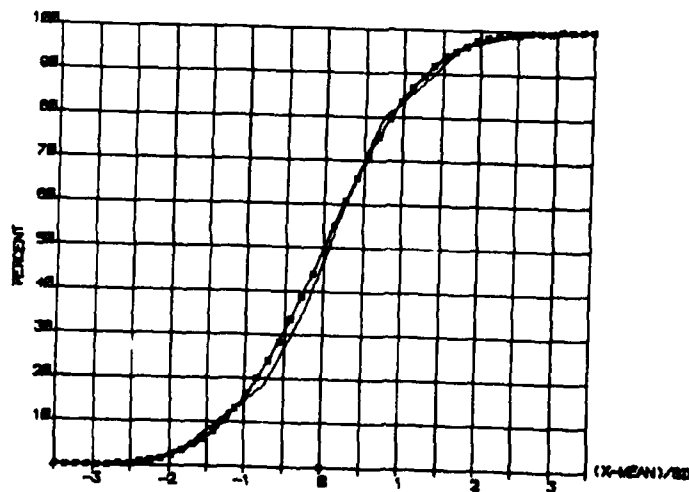
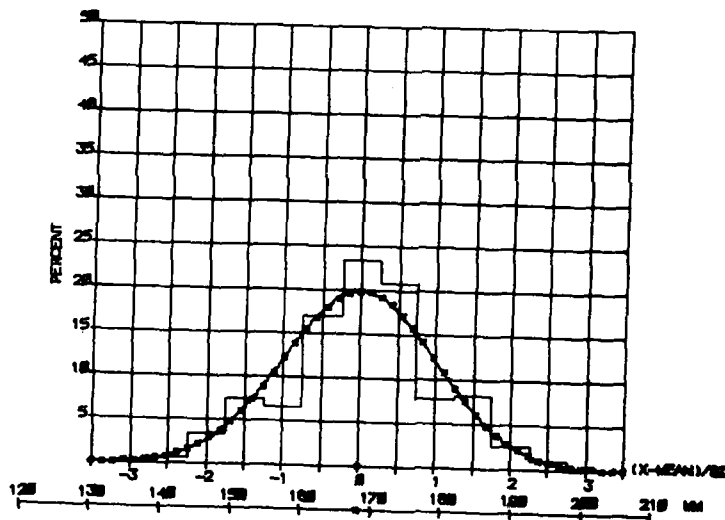
Mean : 168.1

Standard Deviation : 10.8

Coefficient of Skewness: -0.04

Coefficient of Kurtosis : 0.00

Range of Data : 138-204



1st percentile	143
3rd percentile	148
5th percentile	150
10th percentile	154
15th percentile	157
20th percentile	159
25th percentile	161
30th percentile	162
40th percentile	165
50th percentile	168
60th percentile	171
70th percentile	174
75th percentile	175
80th percentile	177
85th percentile	179
90th percentile	182
95th percentile	186
97th percentile	188
99th percentile	193

TABLE 9

Head Circumference

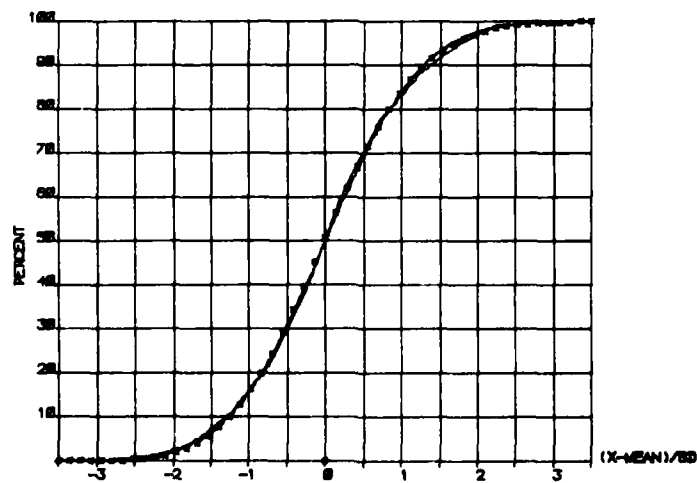
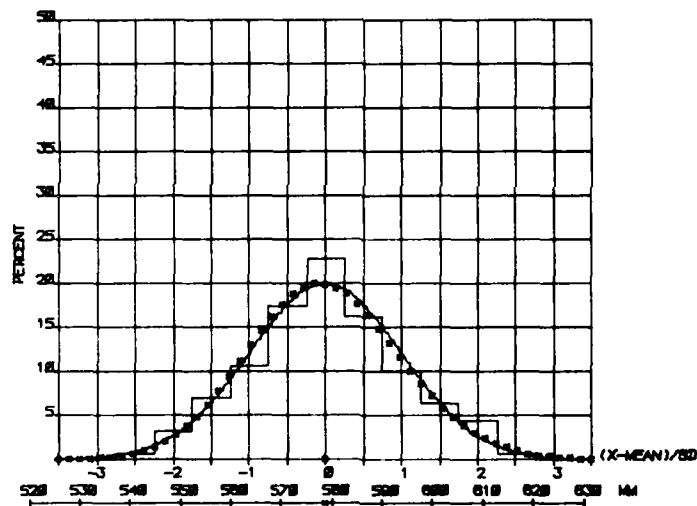
Subject sits erect, looking straight ahead. Measure the maximum head circumference, the tape passing just over the brow ridges and over the occiput, using just sufficient tape tension to flatten the hair.



TABLE 9

Head Circumference (mm)

Number of Subjects : 456
 Mean: : 578.8
 Standard Deviation : 15.1
 Coefficient of Skewness: 0.16
 Coefficient of Kurtosis : -0.09
 Range of Data : 540-633



1st percentile 545
 3rd percentile 551
 5th percentile 555
 10th percentile 560
 15th percentile 563
 20th percentile 566
 25th percentile 568
 30th percentile 571
 40th percentile 575
 50th percentile 578
 60th percentile 582
 70th percentile 586
 75th percentile 589
 80th percentile 591
 85th percentile 594
 90th percentile 598
 95th percentile 604
 97th percentile 608
 99th percentile 616

TABLE 10

Neck Circumference

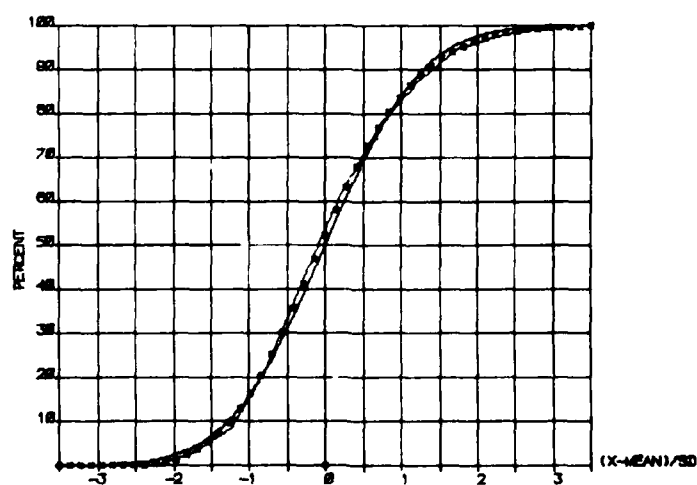
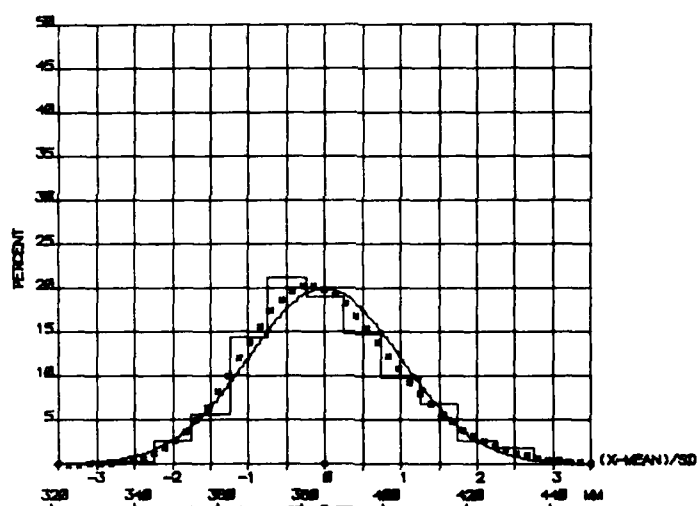
Subject sits erect, looking straight ahead. Measure the circumference of the neck ensuring that the tape is at right angles to the longitudinal axis of the neck and that the datum edge of the tape passes over the tip of the thyroid cartilage.



TABLE 10

Neck Circumference (mm)

Number of Subjects : 456
 Mean : 385.8
 Standard Deviation : 18.3
 Coefficient of Skewness: 0.38
 Coefficient of Kurtosis : 0.18
 Range of Data : 343-454



1st percentile	348
3rd percentile	354
5th percentile	357
10th percentile	363
15th percentile	367
20th percentile	370
25th percentile	373
30th percentile	375
40th percentile	380
50th percentile	385
60th percentile	389
70th percentile	394
75th percentile	397
80th percentile	401
85th percentile	405
90th percentile	410
95th percentile	418
97th percentile	423
99th percentile	433

TABLE 11

Chest Circumference

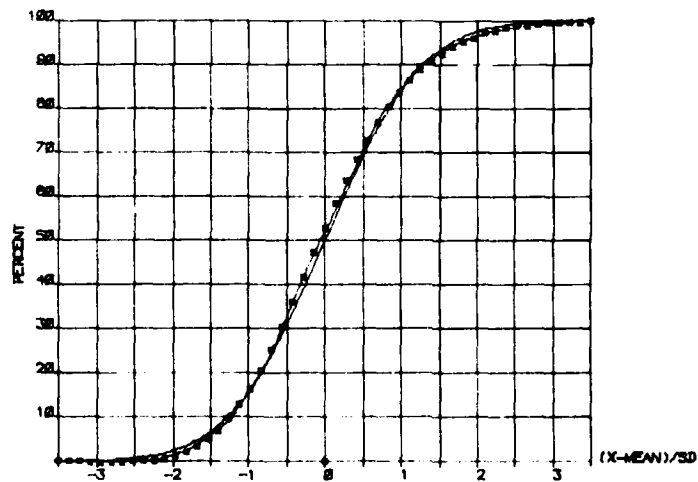
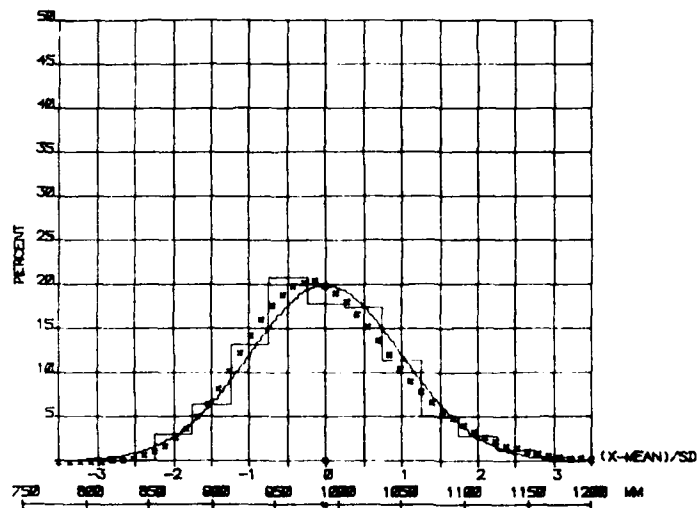
Subject stands erect, feet approximately 100 mm apart, with arms away from the sides. The tape is passed horizontally around the chest, aligning the datum edge with the nipples and the chest marks made on the subject's back. The arms are lowered, tape alignment checked and Chest Circumference measured at the end of a normal inspiration.



TABLE 11

Chest Circumference (mm)

Number of Subjects : 456
 Mean : 989.1
 Standard Deviation : 60.3
 Coefficient of Skewness: 0.44
 Coefficient of Kurtosis : 0.39
 Range of Data : 854-1247



1st percentile	867
3rd percentile	886
5th percentile	896
10th percentile	914
15th percentile	927
20th percentile	937
25th percentile	946
30th percentile	955
40th percentile	970
50th percentile	985
60th percentile	1000
70th percentile	1017
75th percentile	1027
80th percentile	1038
85th percentile	1052
90th percentile	1070
95th percentile	1097
97th percentile	1115
99th percentile	1147

TABLE 12

Waist Circumference

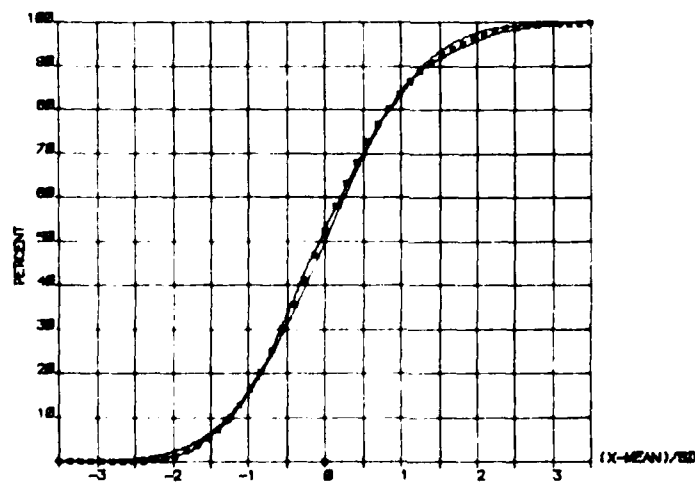
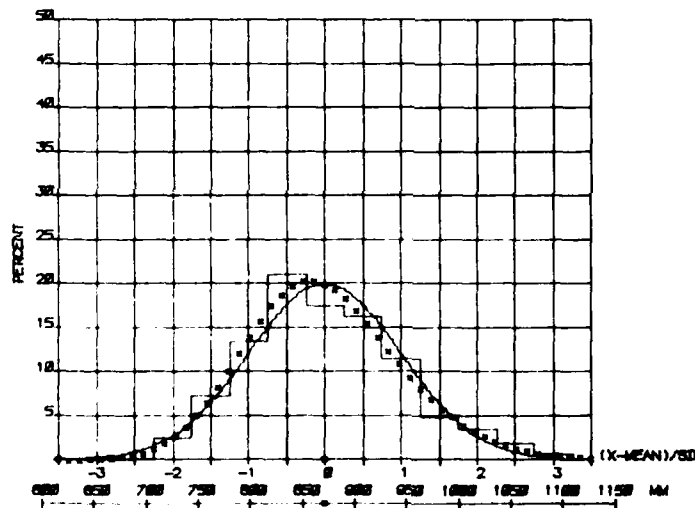
Subject stands erect, heels approximately 100 mm apart, with arms away from the sides. The tape is passed horizontally around the waist, aligning the datum edge with the umbilicus and the waist marks made on the subject's back. The arms are lowered, tape alignment checked, and the Waist Circumference measured.



TABLE 12

Waist Circumference (mm)

Number of Subjects : 456
 Mean : 871.5
 Standard Deviation : 73.0
 Coefficient of Skewness: 0.38
 Coefficient of Kurtosis : -0.11
 Range of Data : 710-1092



1st percentile	721
3rd percentile	745
5th percentile	758
10th percentile	781
15th percentile	796
20th percentile	809
25th percentile	820
30th percentile	830
40th percentile	849
50th percentile	867
60th percentile	886
70th percentile	906
75th percentile	918
80th percentile	932
85th percentile	948
90th percentile	969
95th percentile	1001
97th percentile	1021
99th percentile	1060

TABLE 13

Buttock Circumference

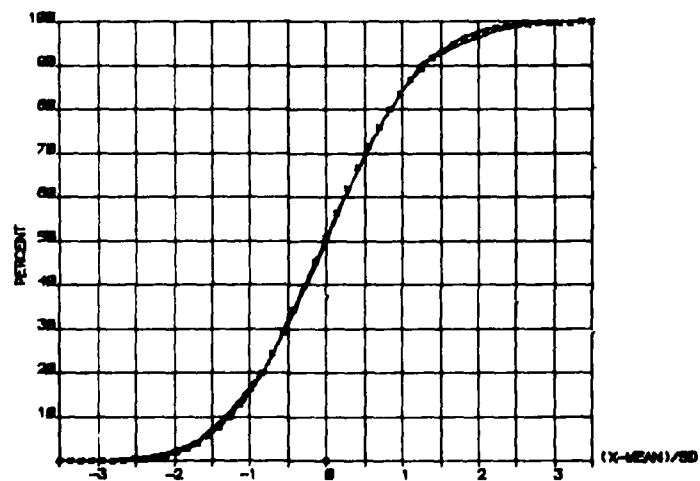
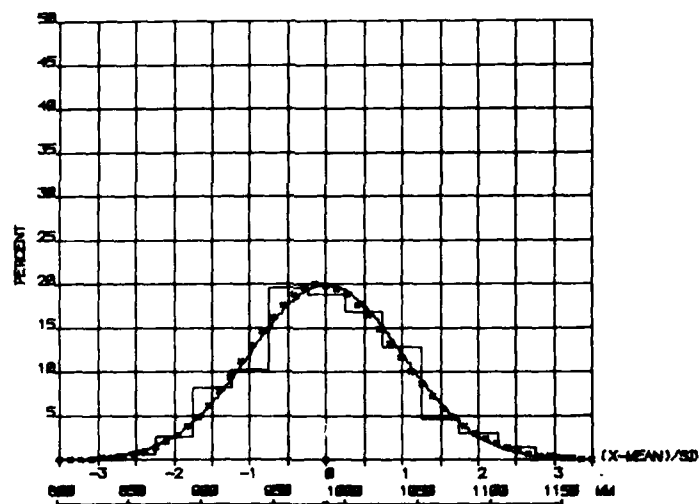
Subject stands erect, feet together. Measure Buttock Circumference with the tape passing horizontally around the maximum posterior protuberance of the buttocks.



TABLE 13

Buttock Circumference (mm)

Number of Subjects : 456
 Mean : 986.3
 Standard Deviation : 52.7
 Coefficient of Skewness: 0.16
 Coefficient of Kurtosis : -0.07
 Range of Data : 848-1143



1st percentile	870
3rd percentile	891
5th percentile	902
10th percentile	920
15th percentile	932
20th percentile	942
25th percentile	950
30th percentile	958
40th percentile	972
50th percentile	985
60th percentile	998
70th percentile	1013
75th percentile	1021
80th percentile	1030
85th percentile	1041
90th percentile	1055
95th percentile	1075
97th percentile	1089
99th percentile	1115

TABLE 14

Vertical Trunk Circumference

Subject stands erect, looking straight ahead, heels approximately 100 mm apart and the arms relaxed by the sides. Measure Vertical Trunk Circumference, passing the tape back over the left shoulder, the datum edge aligned with the 90 mm shoulder mark, down between the buttocks, through the crotch to the left of the genitals and up the front of the trunk spanning all body hollows. Adjust the tape tension so that firm pressure is applied to the crotch without indenting the shoulder.

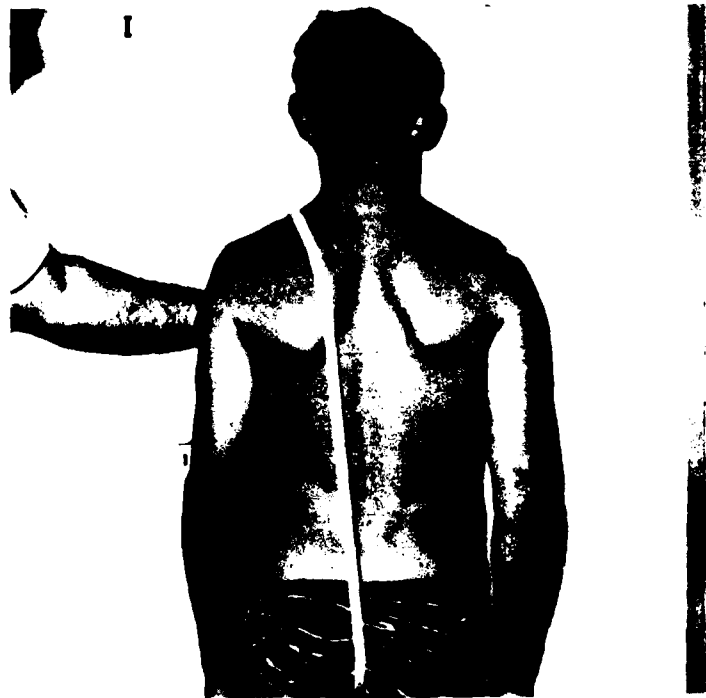
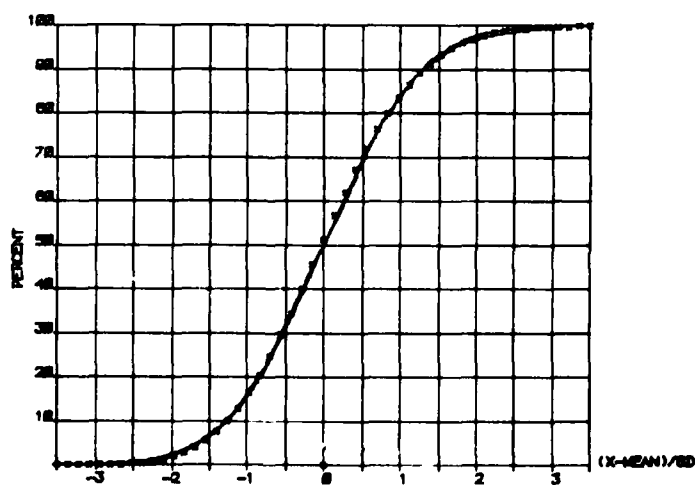
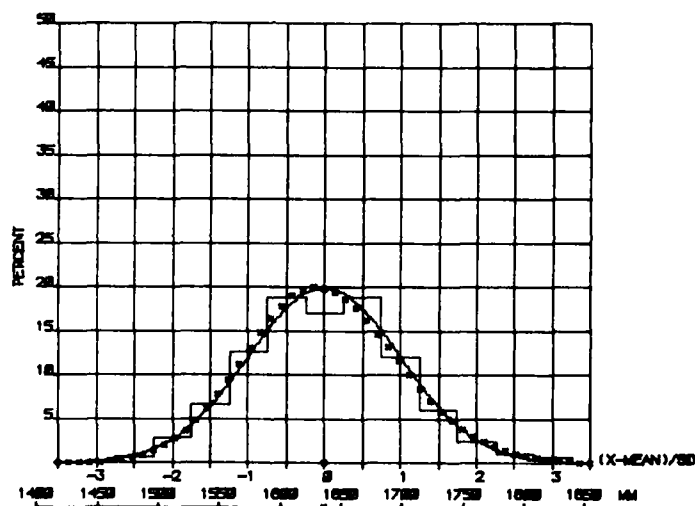


TABLE 14

Vertical Trunk Circumference (mm)

Number of Subjects : 456
 Mean : 1635.7
 Standard Deviation : 62.4
 Coefficient of Skewness: 0.19
 Coefficient of Kurtosis : 0.05
 Range of Data : 1477-1830



1st percentile 1499
 3rd percentile 1523
 5th percentile 1536
 10th percentile 1557
 15th percentile 1571
 20th percentile 1583
 25th percentile 1593
 30th percentile 1602
 40th percentile 1618
 50th percentile 1634
 60th percentile 1650
 70th percentile 1667
 75th percentile 1677
 80th percentile 1688
 85th percentile 1701
 90th percentile 1717
 95th percentile 1742
 97th percentile 1758
 99th percentile 1789

TABLE 15

Buttock-Heel Length

Subject sits on the measuring rig with both legs out straight and the knees locked. The subject is instructed to '... push your buttocks as far as possible into the back wall'. Before the subject relaxes, the foot block is brought up to the left heel and the distance of the datum edge from the rear wall of the measuring device is recorded.



TABLE 15

Buttock-Heel Length (mm)

Number of Subjects : 456

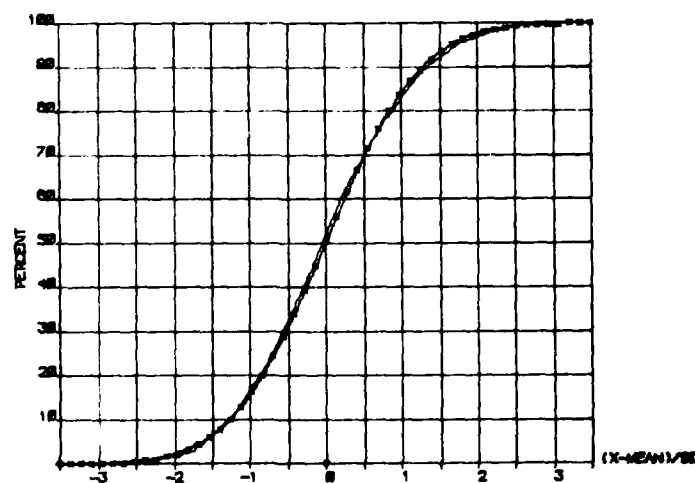
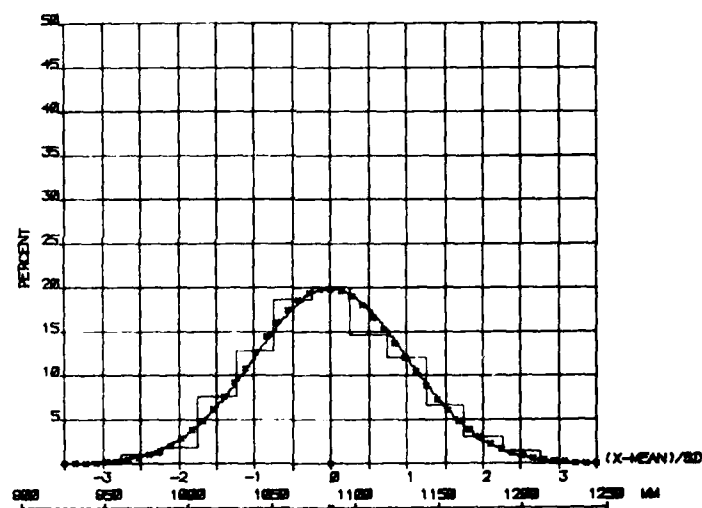
Mean : 1085.1

Standard Deviation : 45.5

Coefficient of Skewness: 0.08

Coefficient of Kurtosis : -0.21

Range of Data : 963-1205



1st percentile	982
3rd percentile	1001
5th percentile	1011
10th percentile	1027
15th percentile	1038
20th percentile	1047
25th percentile	1054
30th percentile	1061
40th percentile	1073
50th percentile	1084
60th percentile	1096
70th percentile	1108
75th percentile	1115
80th percentile	1123
85th percentile	1132
90th percentile	1144
95th percentile	1161
97th percentile	1172
99th percentile	1194

TABLE 16

Mass

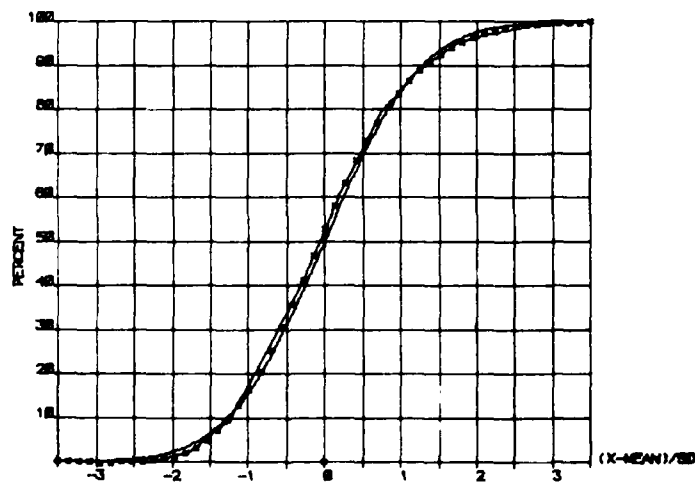
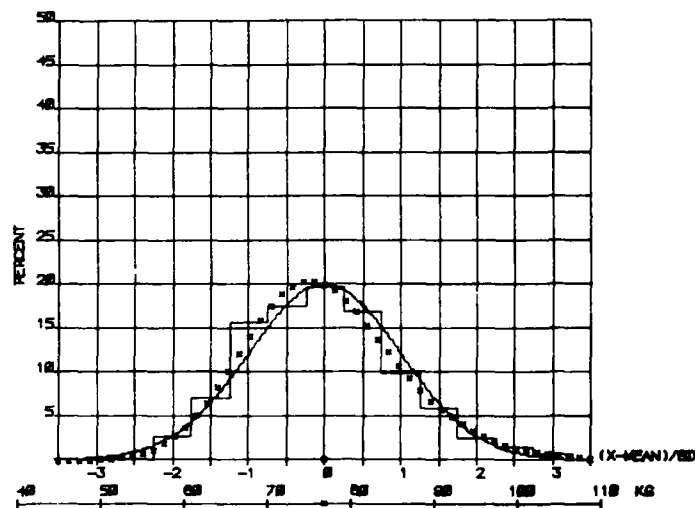
The mass of the subject is recorded standing on a spring scale (subject wearing briefs only).



TABLE 16

Mass (kg)

Number of Subjects : 456
 Mean : 76.9
 Standard Deviation : 9.1
 Coefficient of Skewness: 0.41
 Coefficient of Kurtosis : 0.17
 Range of Data : 56.5-110.0



1st percentile	58.3
3rd percentile	61.1
5th percentile	62.8
10th percentile	65.5
15th percentile	67.4
20th percentile	69.0
25th percentile	70.4
30th percentile	71.7
40th percentile	74.0
50th percentile	76.2
60th percentile	78.6
70th percentile	81.1
75th percentile	82.6
80th percentile	84.3
85th percentile	86.4
90th percentile	89.0
95th percentile	93.0
97th percentile	95.7
99th percentile	100.5

TABLE 17

Sitting Height

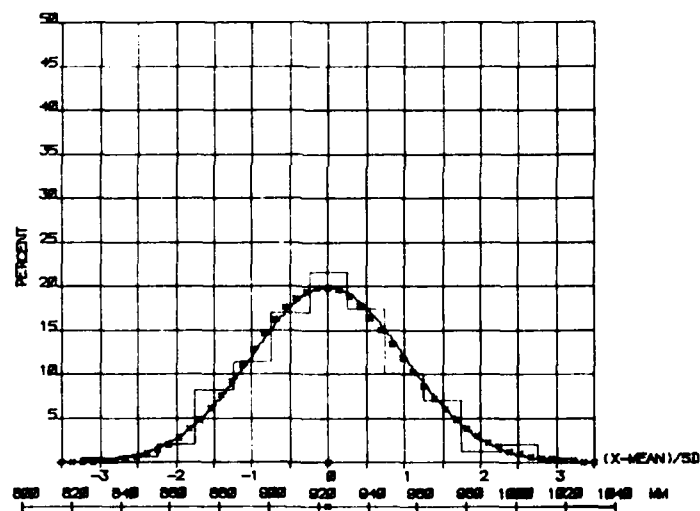
The subject holds the sitting posture. The datum edge is brought down in the midsagittal plane until light contact is made with the vertex. Record the height of the datum edge from the floor. Sitting Height equals datum height less Stool Height.



TABLE 17

Sitting Height (mm)

Number of Subjects : 456
 Mean : 923.9
 Standard Deviation : 30.8
 Coefficient of Skewness: 0.12
 Coefficient of Kurtosis : 0.17
 Range of Data : 833-1021



1st percentile 855
 3rd percentile 867
 5th percentile 874
 10th percentile 885
 15th percentile 892
 20th percentile 898
 25th percentile 903
 30th percentile 907
 40th percentile 916
 50th percentile 923
 60th percentile 931
 70th percentile 940
 75th percentile 944
 80th percentile 950
 85th percentile 956
 90th percentile 964
 95th percentile 976
 97th percentile 983
 99th percentile 998

TABLE 18

Eye Height (Sitting)

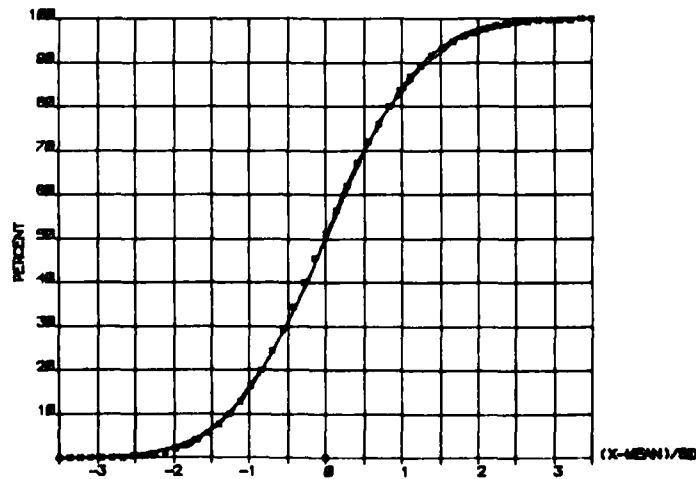
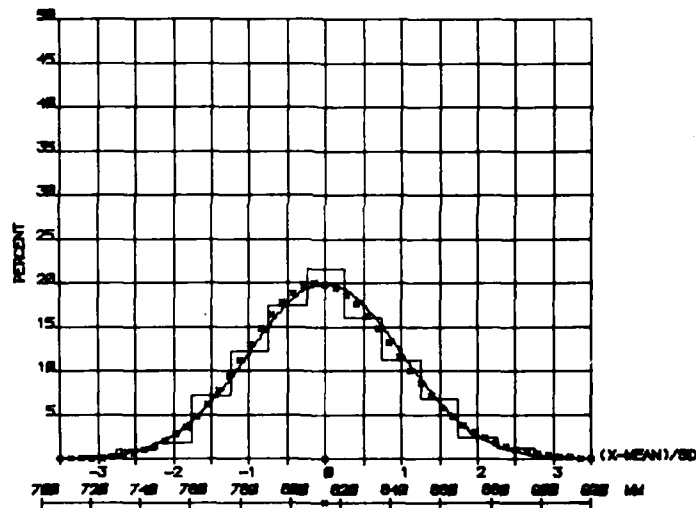
The subject holds the sitting posture. The datum line is brought up until the reflections of this line and the centre of the subject's left pupil, in the mirror opposite, are coincident. Record the height of the datum line from the floor. Eye Height equals datum height less Stool Height.



TABLE 18

Eye Height (Sitting) (mm)

Number of Subjects : 456
 Mean : 813.8
 Standard Deviation : 30.4
 Coefficient of Skewness: 0.17
 Coefficient of Kurtosis : 0.27
 Range of Data : 725-923



1st percentile 747
 3rd percentile 759
 5th percentile 765
 10th percentile 775
 15th percentile 782
 20th percentile 788
 25th percentile 793
 30th percentile 797
 40th percentile 805
 50th percentile 813
 60th percentile 821
 70th percentile 829
 75th percentile 834
 80th percentile 839
 85th percentile 845
 90th percentile 853
 95th percentile 865
 97th percentile 873
 99th percentile 888

TABLE 19

Shoulder Height (Sitting)

The subject holds the sitting posture. The datum edge is brought down until light contact is made with the 90 mm mark on the left shoulder. Record the height of the datum edge from the floor. Shoulder Height equals datum height less Stool Height.



TABLE 19

Shoulder Height (Sitting) (mm)

Number of Subjects : 456

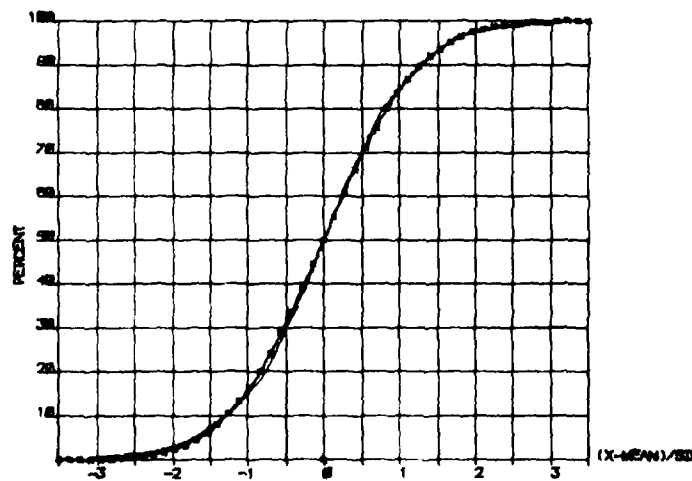
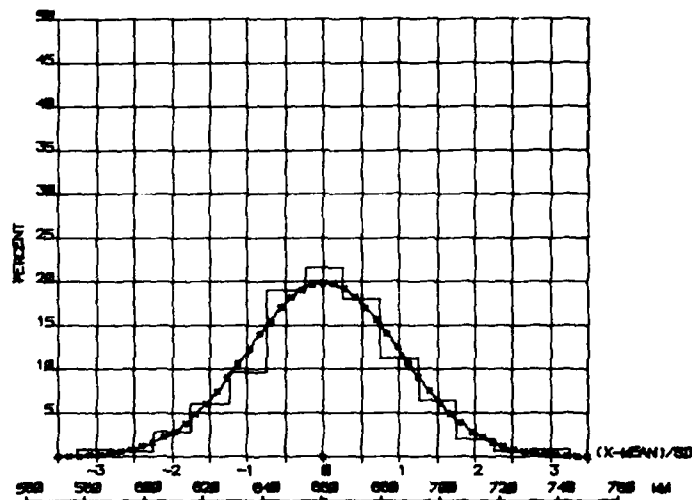
Mean : 660.7

Standard Deviation : 25.6

Coefficient of Skewness: -0.01

Coefficient of Kurtosis : 0.43

Range of Data : 581-742



1st percentile	601
3rd percentile	612
5th percentile	618
10th percentile	628
15th percentile	634
20th percentile	639
25th percentile	643
30th percentile	647
40th percentile	654
50th percentile	661
60th percentile	667
70th percentile	674
75th percentile	678
80th percentile	682
85th percentile	687
90th percentile	693
95th percentile	703
97th percentile	709
99th percentile	720

TABLE 20

Acromial Height (Sitting)

The subject holds the sitting posture. The datum edge is brought down until light contact is made with the left acromial mark. Record the height of the datum edge from the floor. Acromial Height equals datum height less Stool Height.



TABLE 20

Acromial Height (Sitting) (mm)

Number of Subjects : 456

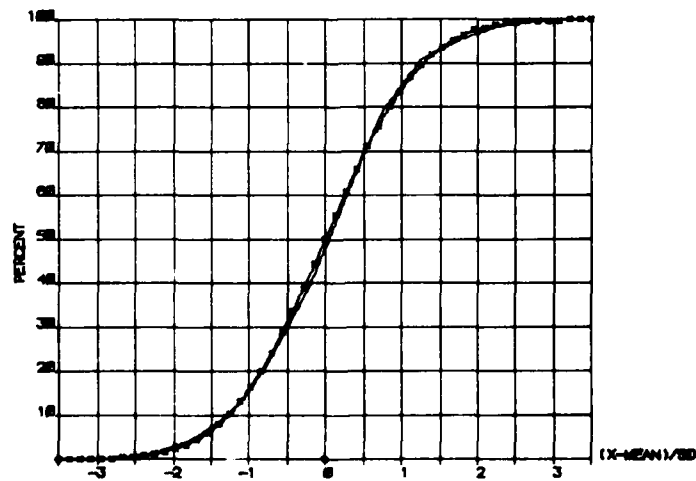
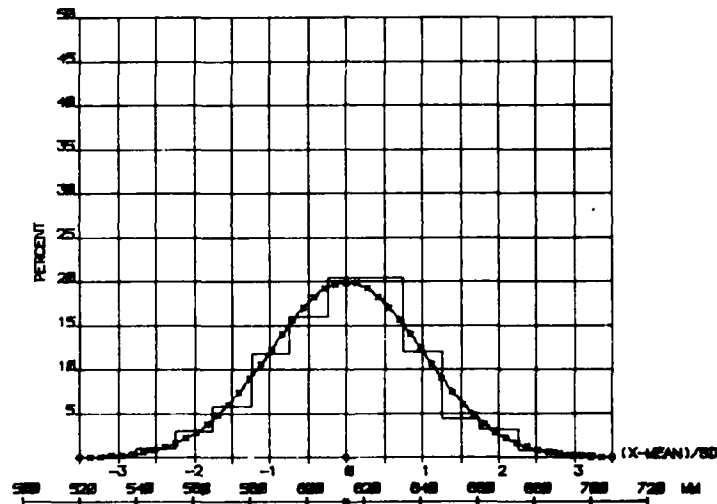
Mean : 613.9

Standard Deviation : 26.7

Coefficient of Skewness: 0.00

Coefficient of Kurtosis : 0.25

Range of Data : 536-699



1st percentile	552
3rd percentile	564
5th percentile	570
10th percentile	580
15th percentile	586
20th percentile	591
25th percentile	596
30th percentile	600
40th percentile	607
50th percentile	614
60th percentile	621
70th percentile	628
75th percentile	632
80th percentile	636
85th percentile	642
90th percentile	648
95th percentile	658
97th percentile	664
99th percentile	676

TABLE 21

Elbow Rest Height

The subject holds the sitting posture except that the forearms are raised and extended forwards horizontally. The hands and fingers are extended in the vertical plane containing the forearm. The datum edge is brought up to make contact with the lower edge of the left olecranon. Record the height of the datum edge from the floor. Elbow Rest Height equals datum height less Stool Height.

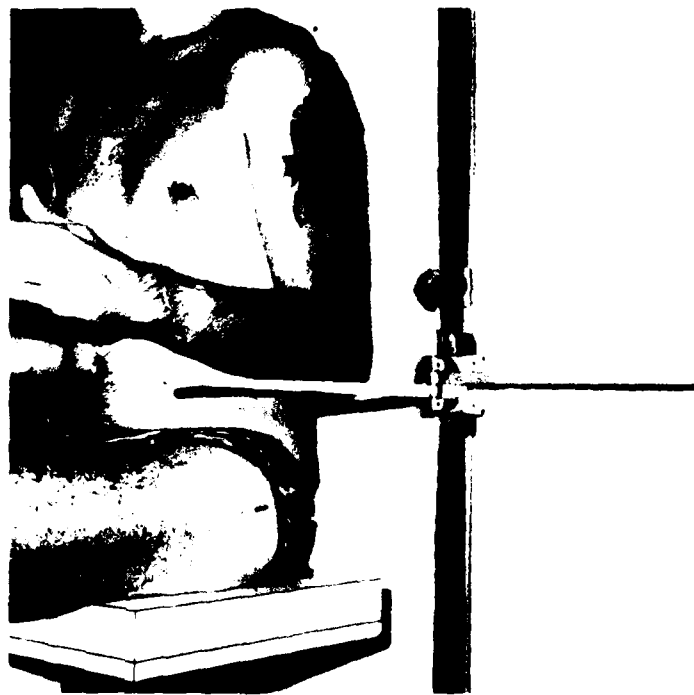


TABLE 21

Elbow Rest Height (mm)

Number of Subjects: : 456

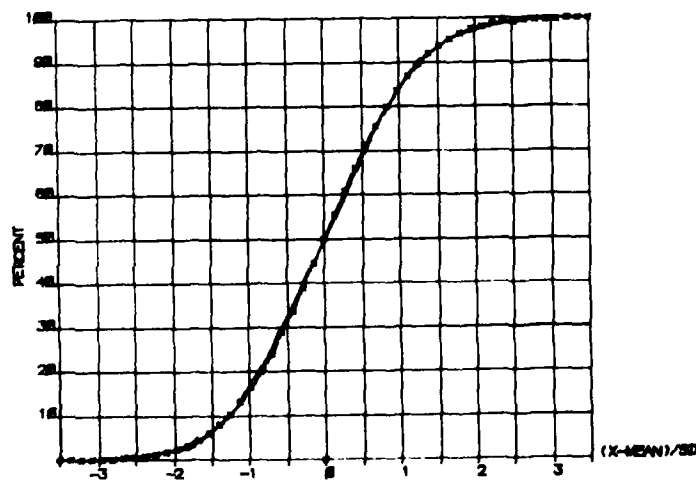
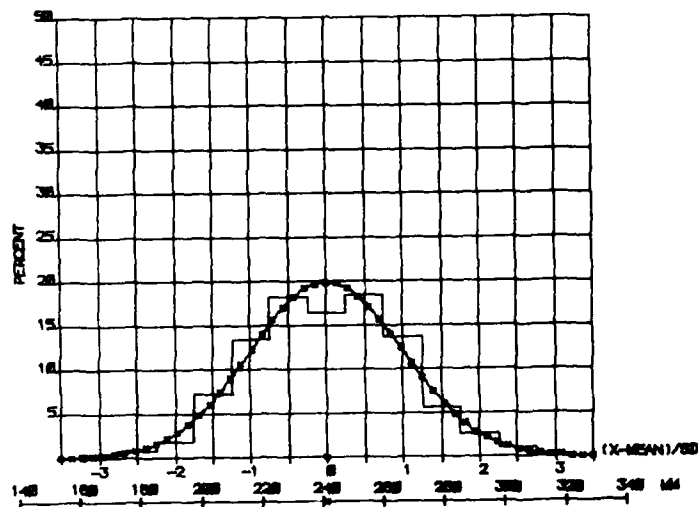
Mean : 241.3

Standard Deviation : 25.1

Coefficient of Skewness: -0.01

Coefficient of Kurtosis : -0.16

Range of Data : 167-318



1st percentile	183
3rd percentile	194
5th percentile	200
10th percentile	209
15th percentile	215
20th percentile	220
25th percentile	224
30th percentile	228
40th percentile	235
50th percentile	241
60th percentile	248
70th percentile	255
75th percentile	258
80th percentile	262
85th percentile	267
90th percentile	273
95th percentile	283
97th percentile	288
99th percentile	300

TABLE 22

Popliteal Height

The subject holds the sitting posture. With the sliding calipers measure the vertical distance from the floor to the underside of the tendon of the left biceps femoris muscle where it joins the calf.

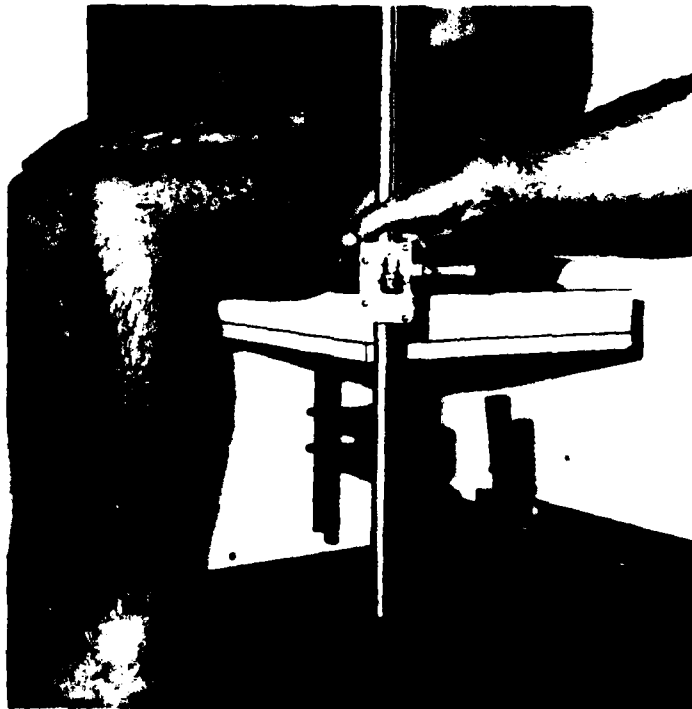
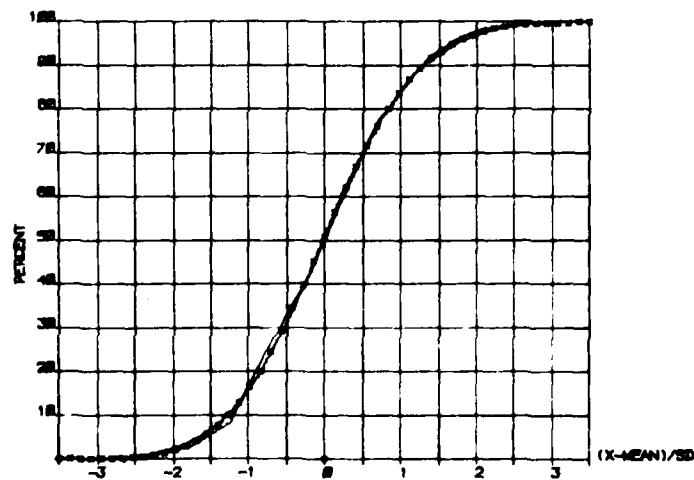
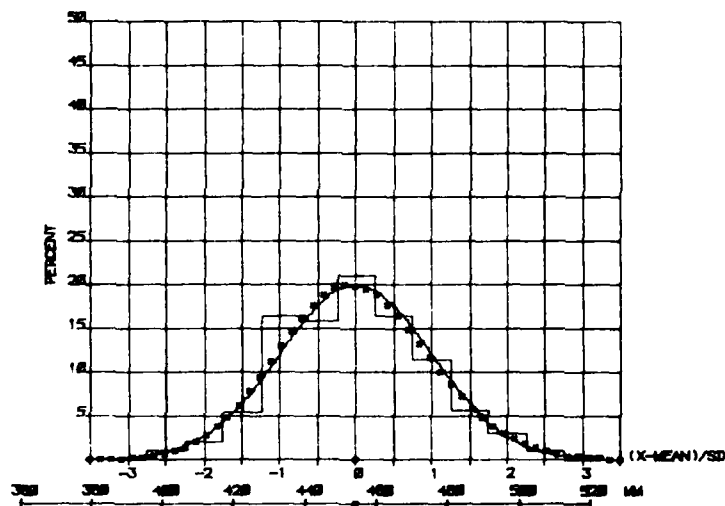


TABLE 22

Popliteal Height (mm)

Number of Subjects : 456
 Mean : 454.2
 Standard Deviation : 21.3
 Coefficient of Skewness: 0.16
 Coefficient of Kurtosis : -0.25
 Range of Data : 397-513



1st percentile	407
3rd percentile	415
5th percentile	420
10th percentile	427
15th percentile	432
20th percentile	436
25th percentile	440
30th percentile	443
40th percentile	448
50th percentile	454
60th percentile	459
70th percentile	465
75th percentile	468
80th percentile	472
85th percentile	476
90th percentile	482
95th percentile	490
97th percentile	496
99th percentile	506

TABLE 23

Bideltoid Breadth

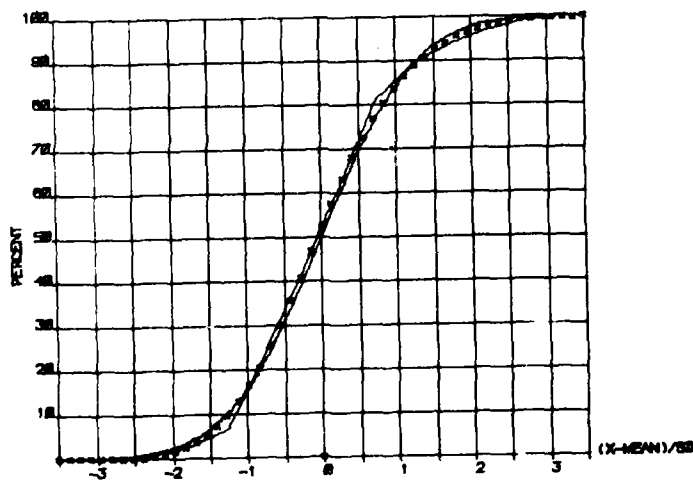
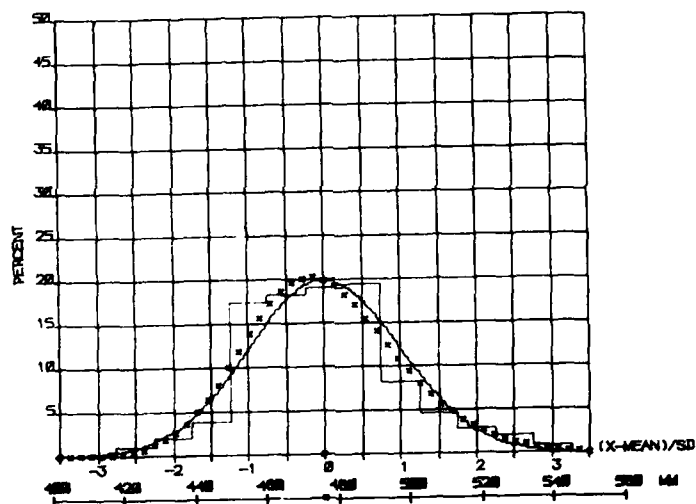
The subject moves across to his right-hand side until the right deltoid muscle is brought into light contact with the perspex wall panel. The circle of skin in contact with the perspex has a diameter of approximately 30 mm (this is monitored in the mirror). The subject regains the sitting posture and the datum edge is moved horizontally until light contact is made with the most distal portion of the left deltoid prominence. Record the distance of the datum edge from the end wall.



TABLE 23

Bideloid Breadth (mm)

Number of Subjects : 456
 Mean : 476.3
 Standard Deviation : 21.2
 Coefficient of Skewness: 0.36
 Coefficient of Kurtosis : 0.32
 Range of Data : 419-543



1st percentile 432
 3rd percentile 439
 5th percentile 443
 10th percentile 450
 15th percentile 454
 20th percentile 458
 25th percentile 461
 30th percentile 464
 40th percentile 470
 50th percentile 475
 60th percentile 480
 70th percentile 486
 75th percentile 490
 80th percentile 494
 85th percentile 498
 90th percentile 504
 95th percentile 514
 97th percentile 520
 99th percentile 531

TABLE 24

Hip Breadth

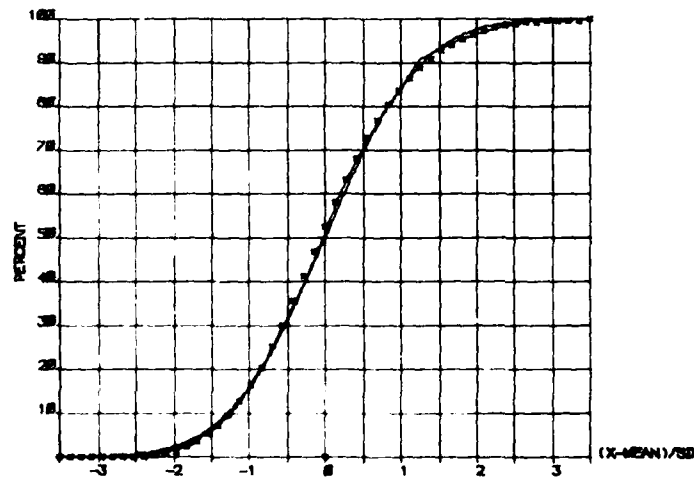
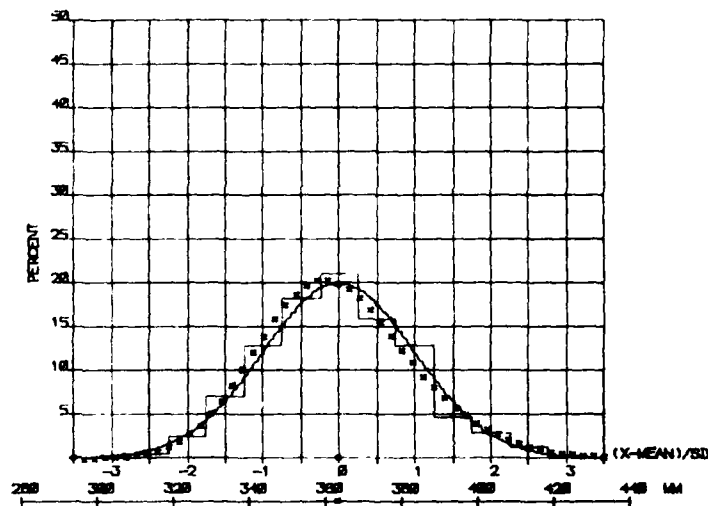
Subject moves across to his right-hand side so that the fleshy part of his right hip makes light contact with the perspex wall panel (monitored in the mirror). The subject's knees are brought together; feet are flat on the floor. The datum edge is moved horizontally until light contact is made with the widest region of the left hip. Record the distance of the datum edge from the end wall.



TABLE 24

Hip Breadth (mm)

Number of Subjects : 456
 Mean : 363.3
 Standard Deviation : 20.0
 Coefficient of Skewness: 0.39
 Coefficient of Kurtosis : 0.73
 Range of Data : 314-459



1st percentile	322
3rd percentile	329
5th percentile	332
10th percentile	338
15th percentile	343
20th percentile	346
25th percentile	349
30th percentile	352
40th percentile	357
50th percentile	362
60th percentile	367
70th percentile	373
75th percentile	376
80th percentile	380
85th percentile	384
90th percentile	390
95th percentile	399
97th percentile	404
99th percentile	415

TABLE 25

Functional Reach

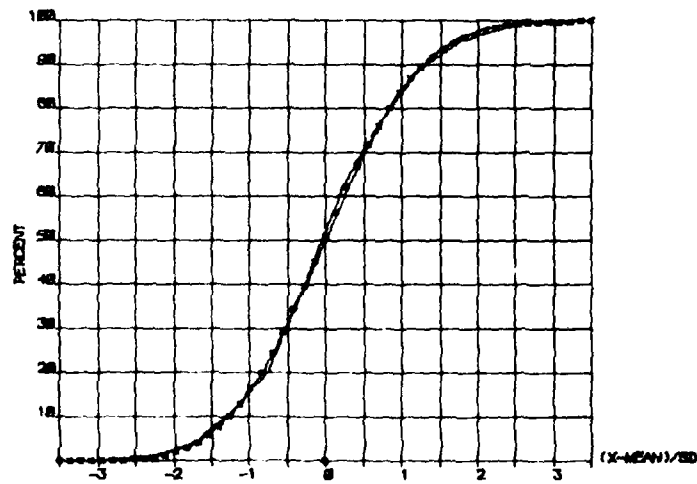
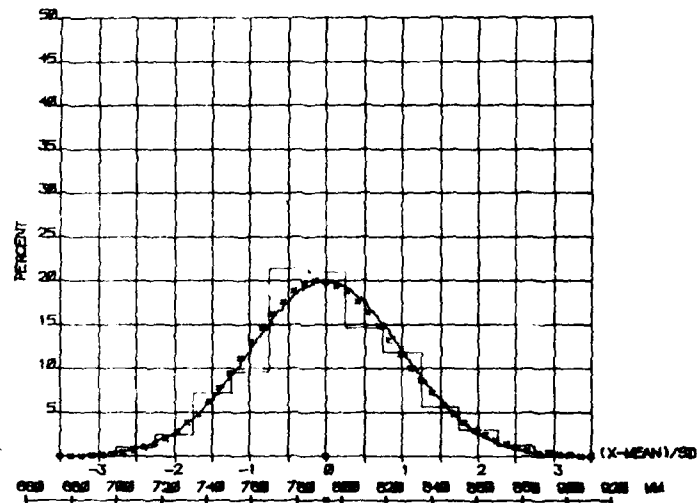
The subject sits erect looking straight ahead at the reflection of his pupils in the mirror directly in front of him. Both shoulder blades are symmetrically and lightly touching the perspex panel in the end wall of the measuring rig (monitored in the mirror). The arms are extended forward horizontally and the hand is pronated with the tip of the index finger touching the extended thumb (which is held in the plane of the extended arm). The datum edge is moved horizontally until contact is made with the tip of the left thumb. Record the distance of the datum edge from the end wall.



TABLE 25

Functional Reach (mm)

Number of Subjects : 456
 Mean : 793.1
 Standard Deviation : 33.8
 Coefficient of Skewness: 0.16
 Coefficient of Kurtosis : 0.03
 Range of Data : 709-906



1st percentile	718
3rd percentile	732
5th percentile	739
10th percentile	750
15th percentile	758
20th percentile	764
25th percentile	770
30th percentile	775
40th percentile	784
50th percentile	792
60th percentile	801
70th percentile	810
75th percentile	815
80th percentile	821
85th percentile	828
90th percentile	837
95th percentile	850
97th percentile	859
99th percentile	875

TABLE 26

Buttock-Knee Length

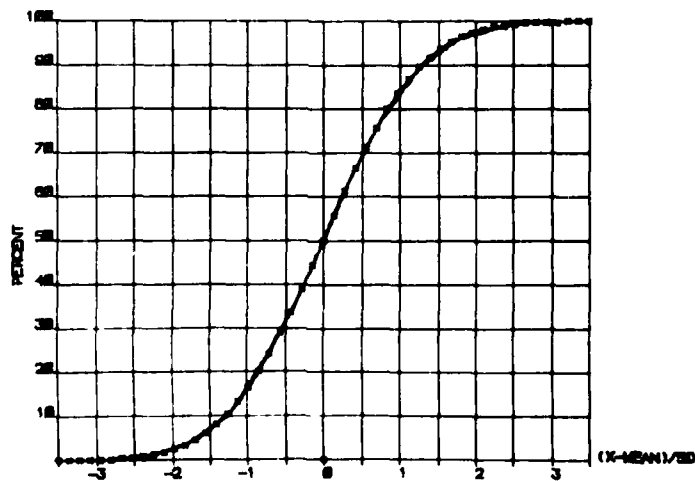
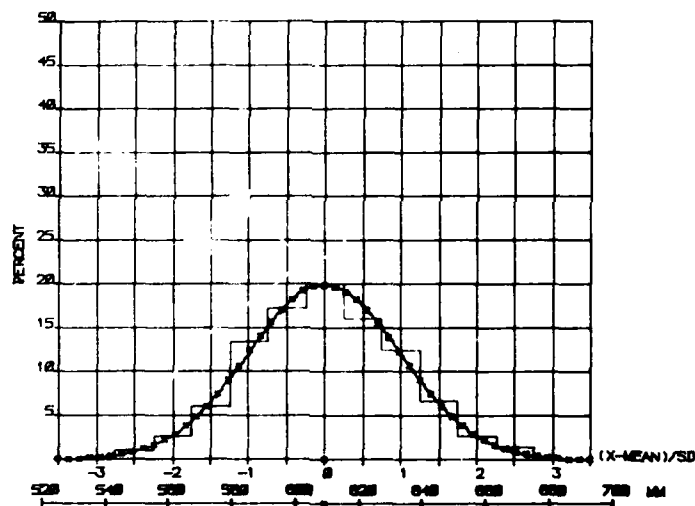
The subject sits erect, feet flat on the floor and thighs parallel to the rear wall of the measuring rig. The subject is instructed to '... push your buttocks back until you have equal pressure on both buttocks against the perspex wall'. Both shoulder blades are symmetrically and lightly touching the perspex panel in the end wall of the measuring rig. The datum edge is moved horizontally until contact is made with the most forward prominence of the left patella. Record the distance of the datum edge from the end wall.



TABLE 26

Buttock-Knee Length (mm)

Number of Subjects : 456
 Mean : 609.2
 Standard Deviation : 24.0
 Coefficient of Skewness: 0.02
 Coefficient of Kurtosis : -0.22
 Range of Data : 541-670



1st percentile 554
 3rd percentile 564
 5th percentile 570
 10th percentile 578
 15th percentile 584
 20th percentile 589
 25th percentile 593
 30th percentile 597
 40th percentile 603
 50th percentile 609
 60th percentile 615
 70th percentile 622
 75th percentile 625
 80th percentile 629
 85th percentile 634
 90th percentile 640
 95th percentile 649
 97th percentile 654
 99th percentile 665

TABLE 27

Thigh Clearance Height

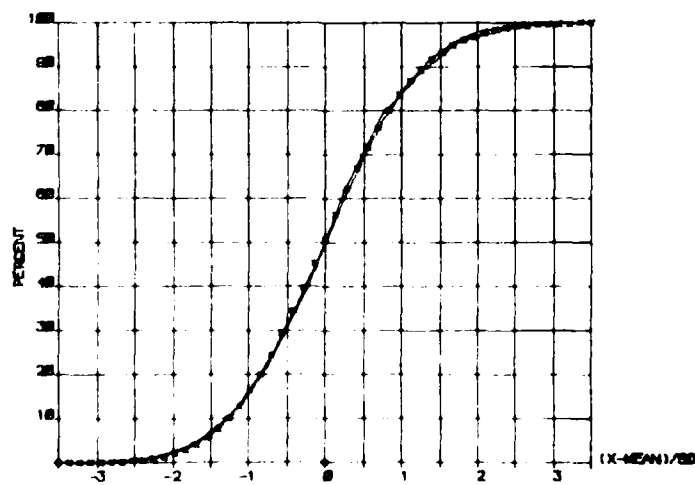
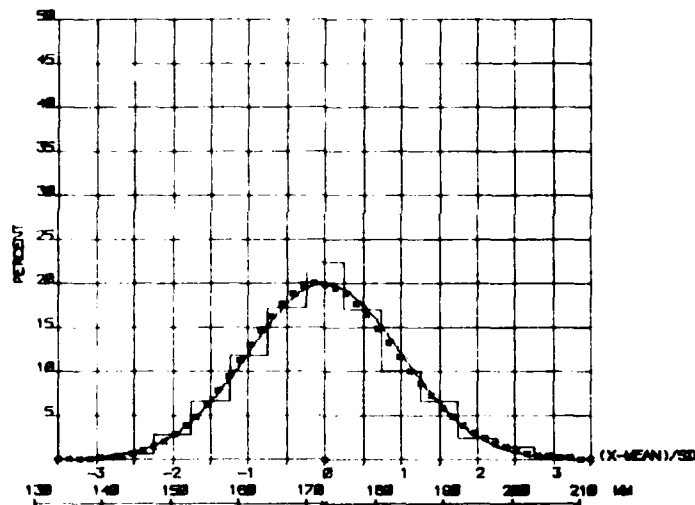
The subject sits erect, feet flat on the floor, arms hanging vertically and lightly touching the sides. The datum edge is brought down to make light contact with the highest point on the left thigh. Record the height of the datum edge from the floor. Thigh Clearance Height equals datum height less Stool Height.



TABLE 27

Thigh Clearance Height (mm)

Number of Subjects : 456
 Mean : 172.6
 Standard Deviation : 11.2
 Coefficient of Skewness: 0.15
 Coefficient of Kurtosis : 0.19
 Range of Data : 135-208



1st percentile	148
3rd percentile	152
5th percentile	155
10th percentile	158
15th percentile	161
20th percentile	163
25th percentile	165
30th percentile	167
40th percentile	169
50th percentile	172
60th percentile	175
70th percentile	178
75th percentile	180
80th percentile	182
85th percentile	184
90th percentile	187
95th percentile	191
97th percentile	194
99th percentile	200

TABLE 28

Stool Height

The subject stands and moves away from the stool. The datum edge is brought down to make contact with the upper surface of the stool seat. Record the height of the datum edge from the floor.

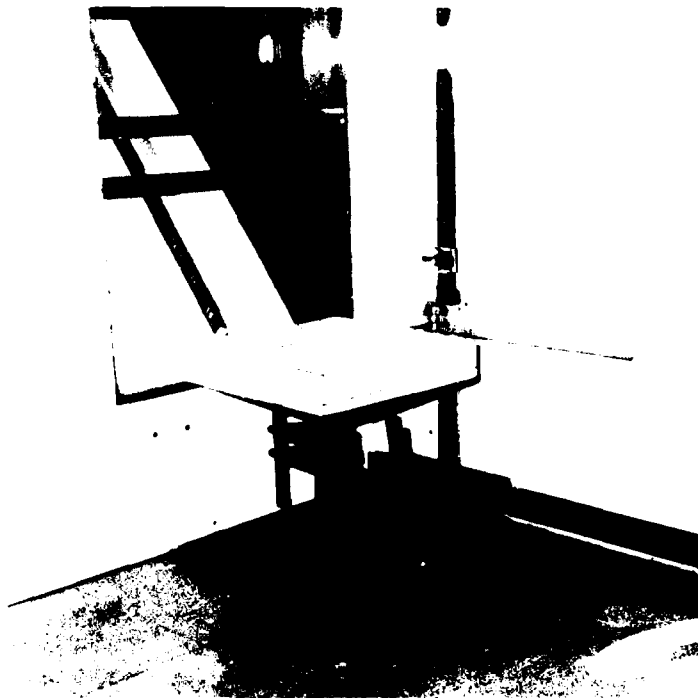
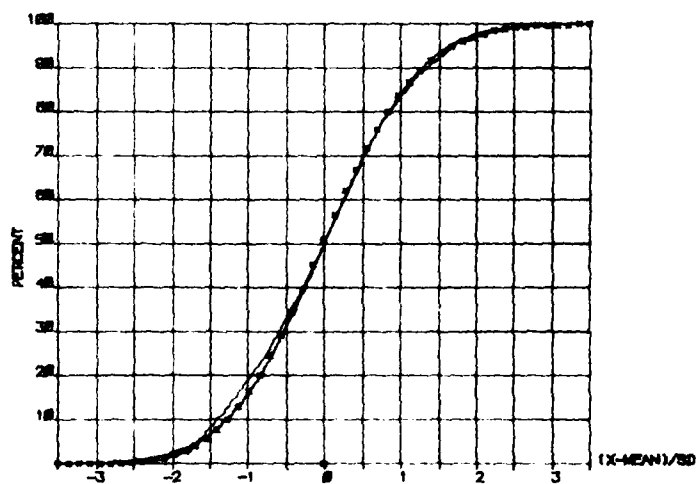
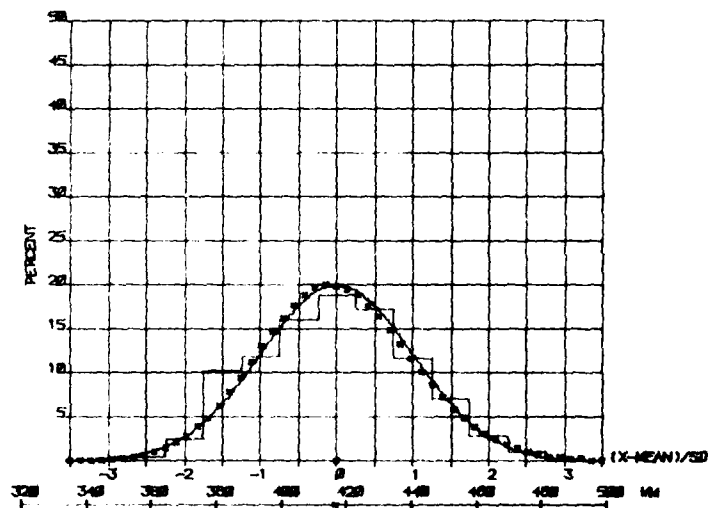


TABLE 28

Stool Height (mm)

Number of Subjects : 456
 Mean : 416.7
 Standard Deviation : 23.4
 Coefficient of Skewness: 0.16
 Coefficient of Kurtosis : -0.31
 Range of Data : 261-492



1st percentile 365
 3rd percentile 374
 5th percentile 379
 10th percentile 387
 15th percentile 392
 20th percentile 397
 25th percentile 401
 30th percentile 404
 40th percentile 410
 50th percentile 416
 60th percentile 422
 70th percentile 428
 75th percentile 432
 80th percentile 436
 85th percentile 441
 90th percentile 447
 95th percentile 456
 97th percentile 462
 99th percentile 474

TABLE 29

Stature

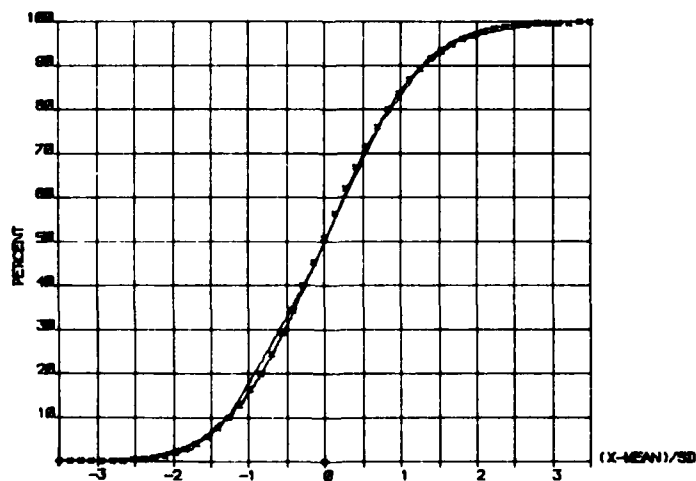
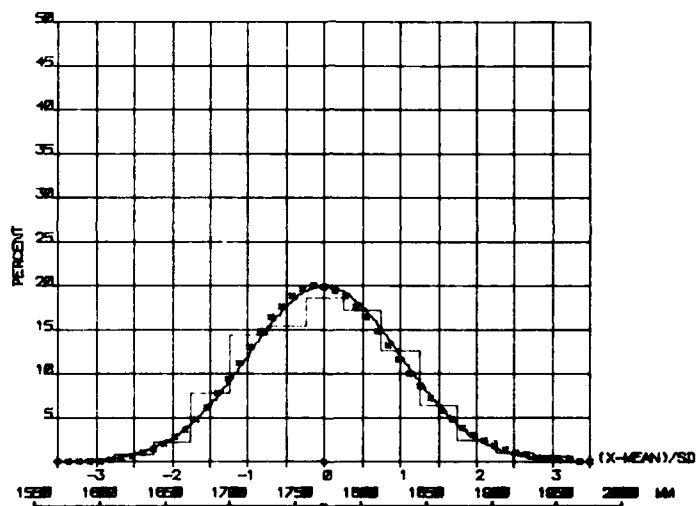
The subject stands erect, looking straight ahead, heels together and back free of the wall. The datum edge is brought down in the midsagittal plane until light contact is made with the vertex. Record the height of the datum edge from the floor.



TABLE 29

Stature (mm)

Number of Subjects : 456
 Mean : 1771.7
 Standard Deviation : 58.2
 Coefficient of Skewness: 0.16
 Coefficient of Kurtosis : -0.21
 Range of Data : 1632-1950



1st percentile 1643
 3rd percentile 1666
 5th percentile 1678
 10th percentile 1698
 15th percentile 1711
 20th percentile 1722
 25th percentile 1732
 30th percentile 1740
 40th percentile 1755
 50th percentile 1770
 60th percentile 1785
 70th percentile 1801
 75th percentile 1810
 80th percentile 1820
 85th percentile 1832
 90th percentile 1847
 95th percentile 1870
 97th percentile 1885
 99th percentile 1914

TABLE 30

Crotch Height

The subject stands erect looking straight ahead with heels approximately 100 mm apart. The datum edge is pushed up into the floor of the perineum, taking care not to impinge on the buttocks or the genitals. Record the height of the datum edge from the floor.

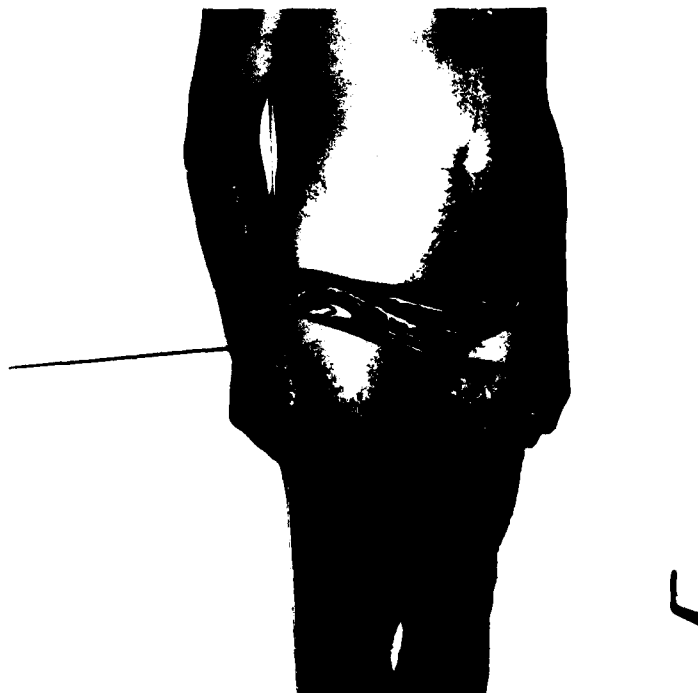
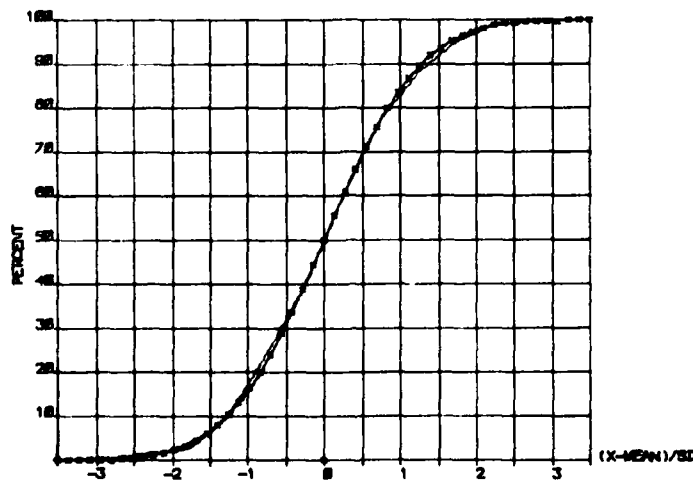
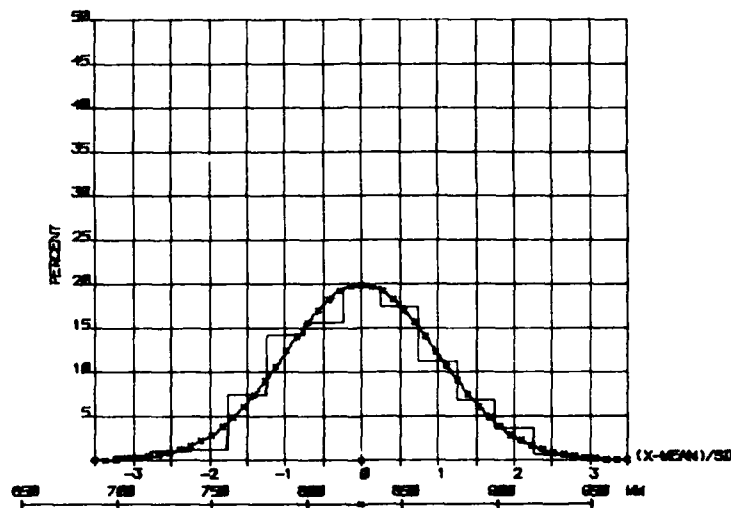


TABLE 30

Crotch Height (mm)

Number of Subjects : 456
 Mean : 828.4
 Standard Deviation : 40.1
 Coefficient of Skewness: 0.00
 Coefficient of Kurtosis : -0.10
 Range of Data : 702-946



1st percentile 735
 3rd percentile 753
 5th percentile 763
 10th percentile 777
 15th percentile 787
 20th percentile 795
 25th percentile 801
 30th percentile 807
 40th percentile 818
 50th percentile 828
 60th percentile 839
 70th percentile 849
 75th percentile 855
 80th percentile 862
 85th percentile 870
 90th percentile 880
 95th percentile 894
 97th percentile 904
 99th percentile 922

TABLE 31

Chest Depth

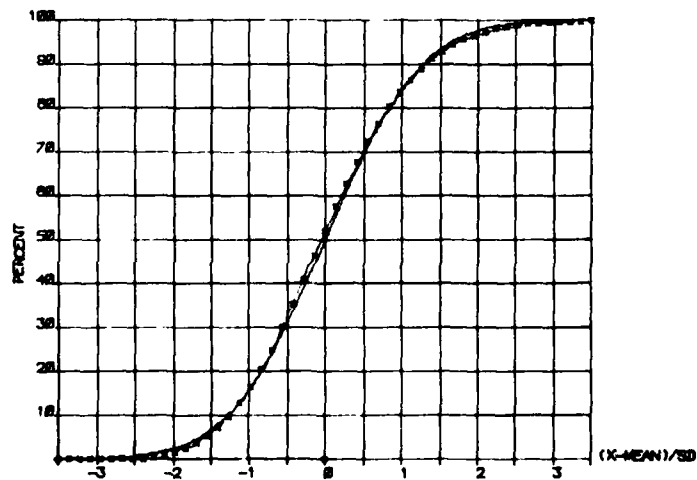
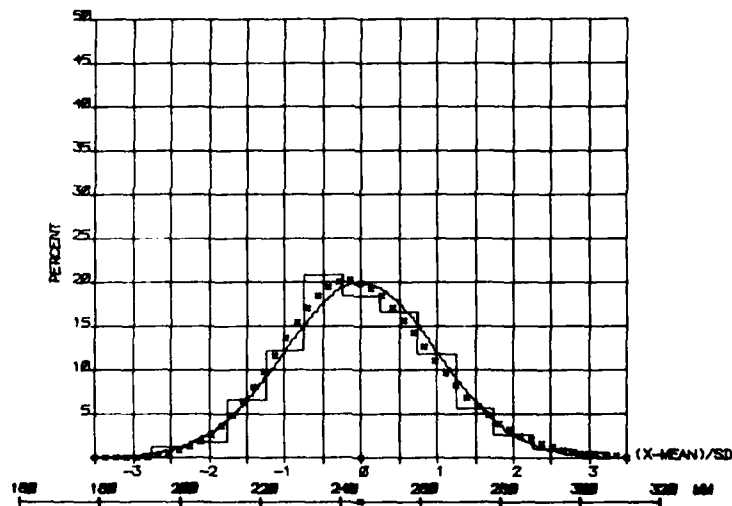
The subject stands erect with arms relaxed by the sides. With the bar of the sliding calipers held horizontally and parallel to the midsagittal plane at the level of the left nipple, measure Chest Depth at the end of a normal inspiration.



TABLE 31

Chest Depth (mm)

Number of Subjects : 456
 Mean : 245.1
 Standard Deviation : 19.0
 Coefficient of Skewness: 0.31
 Coefficient of Kurtosis : 0.39
 Range of Data : 199-320



1st percentile 205
 3rd percentile 212
 5th percentile 215
 10th percentile 221
 15th percentile 225
 20th percentile 229
 25th percentile 232
 30th percentile 234
 40th percentile 239
 50th percentile 244
 60th percentile 249
 70th percentile 254
 75th percentile 257
 80th percentile 261
 85th percentile 265
 90th percentile 270
 95th percentile 278
 97th percentile 283
 99th percentile 293

TABLE 32

Head Breadth

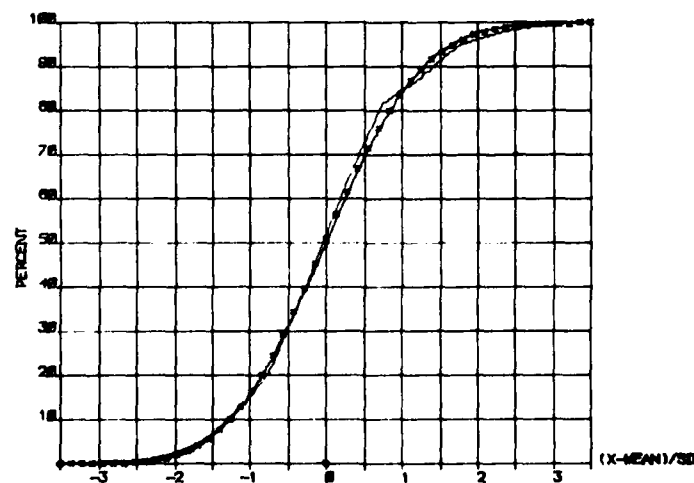
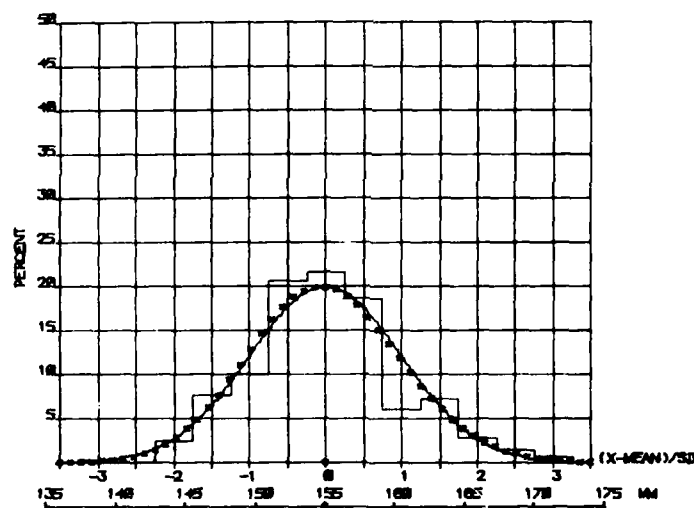
The subject sits, looking straight ahead. With the sliding calipers held in a horizontal plane and applying sufficient pressure with the jaws of the calipers to flatten the hair, measure the maximum head breadth in the coronal plane.



TABLE 32

Head Breadth (mm)

Number of Subjects : 456
 Mean : 155.0
 Standard Deviation : 5.4
 Coefficient of Skewness: 0.14
 Coefficient of Kurtosis : 0.37
 Range of Data : 134-172



1st percentile 143
 3rd percentile 145
 5th percentile 146
 10th percentile 148
 15th percentile 149
 20th percentile 150
 25th percentile 151
 30th percentile 152
 40th percentile 154
 50th percentile 155
 60th percentile 156
 70th percentile 158
 75th percentile 159
 80th percentile 160
 85th percentile 161
 90th percentile 162
 95th percentile 164
 97th percentile 166
 99th percentile 168

TABLE 33

Inter-Elbow Breadth

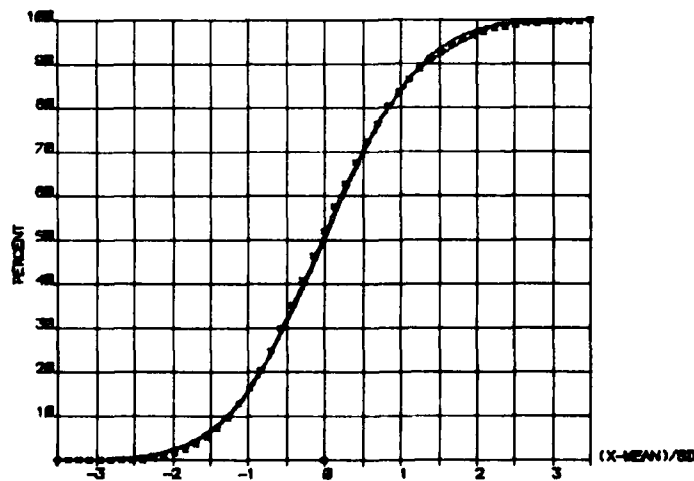
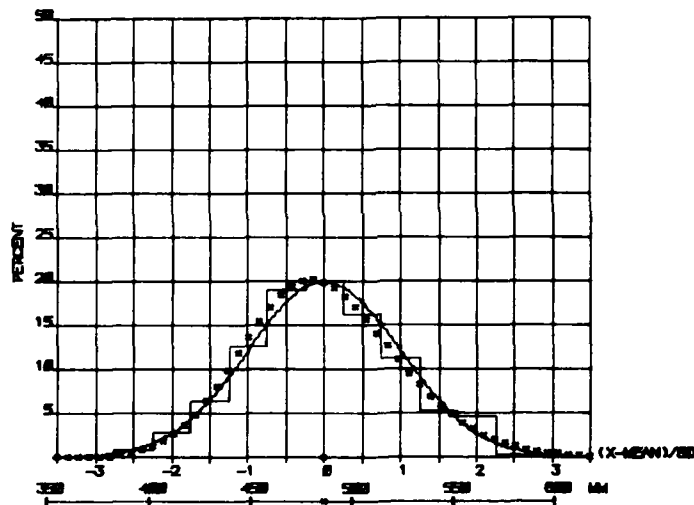
The subject sits erect, upper arms vertical, elbows lightly touching the sides, forearms extended forwards horizontally and palms resting lightly on the support bar. With the sliding calipers measure the horizontal distance between the most distal projections of the lateral epicondyles of the humeri.



TABLE 33

Inter-Elbow Breadth (mm)

Number of Subjects : 456
 Mean : 486.6
 Standard Deviation : 37.6
 Coefficient of Skewness: 0.32
 Coefficient of Kurtosis : 0.24
 Range of Data : 399-624



1st percentile	408
3rd percentile	421
5th percentile	428
10th percentile	440
15th percentile	448
20th percentile	454
25th percentile	460
30th percentile	465
40th percentile	475
50th percentile	485
60th percentile	494
70th percentile	505
75th percentile	511
80th percentile	518
85th percentile	526
90th percentile	536
95th percentile	552
97th percentile	563
99th percentile	582

DISTRIBUTION LIST OF PART 2

Copy No.

AUSTRALIA

Department of Defence

Central Office

Chief Defence Scientist	1
Deputy Chief Defence Scientist	2
Superintendent, Science and Technology Programs	3
Australian Defence Scientific and Technical Representative (UK)	4
Counsellor, Defence Science (USA)	5
Joint Intelligence Organisation	6
Defence Library	7
Assistant Secretary, DISB	8-23
DGAD (NCO)	

Aeronautical Research Laboratories

Chief Superintendent	24
Library	25
Superintendent Systems Division	26
Systems Divisional File	27
Author: K. C. Hendy	28
PO Cybernetics	29

Materials Research Laboratories

Library	30
---------	----

Defence Research Centre, Salisbury

Library	31
---------	----

Engineering Development Establishment

Library	32
---------	----

RAN Research Laboratory

Library	33
---------	----

Defence Standardisation Committee

Human Factors Sub-committee (Secretary)	34-39
---	-------

Air Force Office

Aircraft Research and Development Unit, Scientific Flight Group	40
Air Force Scientific Adviser	41
Technical Division Library	42
D. Air Eng.—AF	43
HQ Support Command (SENGSO)	44
RAAF Academy, Point Cook	45
A/Stand Operational Requirements Branch	46-50

Army Office

Army Scientific Adviser	51
Royal Military College Library	52

Navy Office

Naval Scientific Adviser	53
Director of Naval Aircraft Engineering	54

Department of Productivity	
Government Aircraft Factories	55
Manager/Library	
Department of Transport	56
Secretary	57
Library	
UNITED STATES OF AMERICA	
USAF Aerospace Medical Research Laboratories, Wright Patterson AFB	58
Spares	59-84